

Charting a New Course: Structural Reforms in Colombia's Water Supply and Sanitation Sector

Edited by [Luis A. Andres](#), [David Sislen](#), and [Philippe Marin](#)



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Acronyms

ACUAs	Departmental Water Companies under INSFOPAL
ACUACAR	<i>Aguas de Cartagena S.A. E.S.P.</i>
ACUAMarta	<i>Acueductos y Alcantarillados de Santa Marta S.A.</i>
ADU	<i>Aguas de Uraba</i>
AGBAR	<i>Sociedad General de Aguas de Barcelona, S.A.</i>
CAF	Andean Development Corporation <i>Corporación Andina de Fomento</i>
CAR	Regional Autonomous Corporations <i>Corporaciones Autónomas Regionales</i>
CONPES	National Economic and Social Policy Council <i>Consejo Nacional de Política Económica y Social</i>
CRA	Commission for the Regulation of Water Supply and Sanitation <i>Comisión de Regulación de Agua Potable y Saneamiento Básico</i>
DNP	National Planning Department <i>Departamento Nacional de Planeación</i>
EAAB	Bogota Water and Sewer Company <i>Empresa de Acueducto y Alcantarillado de Bogotá</i>
EMAS	<i>Empresa Metropolitana de Aseo S.A. E.S.P, Manizales</i>
EMPO	Municipal Water Companies under INSFOPAL
EMPOMarta	<i>Empresa de Obras Sanitarias de Santa Marta S.A., formerly ACUAMarta</i>
EPD	Local Public Service Companies <i>Empresas Públicas Distritales</i>
EPMB	Public Municipal Companies of Baranquilla <i>Empresas Públicas Municipales de Barranquilla</i>
ESP	Public Service Company <i>Empresa de Servicio Público</i>
FINDETER	Regional Development Financial Institution <i>Financiera de Desarrollo Territorial</i>
FNR	National Royalties Fund <i>Fondo Nacional de Regalías</i>
IANC	Unaccounted For Water Index <i>Índice de Agua No Contabilizada</i>
IADB	Inter-American Development Bank
INSFOPAL	Municipal Development Institute <i>Instituto de Fomento Municipal</i>

LYSA	<i>Lyonnais des Eaux Services Associés</i>
MAVDT	Ministry of Environment, Housing and Territorial Development <i>Ministerio de Ambiente, Vivienda y Desarrollo Territorial</i>
MHCP	Ministry of Finance and Public Credit <i>Ministerio de Hacienda y Crédito Público</i>
PGN	Public Prosecutor's Office <i>Procuración General de la Nación</i>
PME	Corporate Modernization Program <i>Programa de Modernización Empresarial</i>
POMCA	Watershed Administration and Management Plans <i>Planes de Ordenamiento de Manejo de Cuencas Hidrográficas</i>
PSMV	Sanitation and Wastewater Discharge Management Plans <i>Plan de Saneamiento y Manejo de Vertimientos</i>
PSP	Private Sector Participation
SAAM	<i>Sociedad de Acueducto y Alcantarillado de Montería</i>
SGP	General Revenue-Sharing System <i>Sistema General de Participaciones</i>
SO	Specialized Operator
SOE	State-Owned Enterprise
SSPD	Superintendency of Residential Public Services <i>Superintendencia de Servicios Públicos Domiciliarios</i>
WSS	Water Supply and Sanitation

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Executive Summary

Infrastructure plays a key role in promoting economic growth and opportunities. In particular, the efficient provision of basic infrastructure services, like water and sanitation, is a key ingredient in fostering a country's social and economic development. Previous studies have found that infrastructure has a positive impact on output, and can improve economic opportunity, including health and education for the poor, particularly in developing countries.¹ In Argentina, a 2005 study² found that child mortality fell by 8 percent in areas that had experienced improved coverage and quality of basic water and sanitation through utility reform, with most of the reduction occurring in low-income areas where the water network expanded the most³. More generally, Fay and Morrison⁴ found that allowing the poorest quintile in developing countries the same access to basic services as the richest quintile would reduce child mortality by 8% and child underdevelopment by 14%. Calderon and Serven⁵ also found a significant positive impact of infrastructure access and quality on overall inequality⁶.

1 Andres, L., J. Guasch, T. Haven, and V. Foster. 2008. *The Impact of Private Sector Participation in Infrastructure. Lights, Shadows and the Road Ahead*. Washington DC. The World Bank.

2 Galiani, S., P. Gertler, and E. Schargrotsky. 2005. "Water Life: The Impact of the Privatization of Water Services on Child Mortality." *Journal of Political Economy* 113 (February): 83-120.

3 Andres, et. Al (2008)

4 Fay, M. and M. Morrison. 2006. *Infrastructure in Latin America and the Caribbean: Recent Developments and Key Challenges*. Washington DC. The World Bank.

5 Calderon, C. and L. Serven. 2004. "The Effects of Infrastructure Development on Growth and Income Distribution." Policy Research Working Paper No 3401, World Bank, Washington DC.

6 Andres et. Al. (2008)

Thus, providing access to quality water and sanitation infrastructure services is both a public health imperative and an essential step in increasing the quality of life for the poor. It is a critical step for ensuring a population's hygiene, health, and overall well-being. The development of an accessible, efficient, quality-driven, and sustainable basic water and sanitation sector has therefore become a priority for many countries' development agendas. Given its importance, it is an area that should be guided by informed and well thought out policy decisions.

While some countries in Europe have a long tradition of involving the private sector in the provision of public services, during the 1990's an important shift took place in many developing nations in regard to the model of infrastructure service provision⁷. New models, involving private sector participation in a variety of ways, was a result, on one hand, of governments realizing that the private sector could bring needed capital and management expertise to provide viable solutions to the problems posed by poor infrastructure services and, on the other hand, the a realization by private actors that investing in emerging economies could be commercially attractive⁸.

In the Latin America and Caribbean region, this wave of reforms promoted a wide range of institutional approaches, from full blown privatizations, to concessions, to management arrangements of previously state-owned enterprises (SOEs). Both the implementation and success of these reforms have been uneven across sectors. While the telecommunication and electricity sectors have been broadly concessioned, private participation in the water supply and sanitation sector has been limited with less than 13 percent of households in the region being served by a private company in 2003.⁹

Colombia was no exception to this trend and, in fact, emerged as a leader in the development of innovative public-private solutions in the water and sanitation sectors. Beginning in the mid-1990s, Colombia implemented a set of institutional reforms in the sector that provided a framework for private participation in service provision. The main objectives of these reforms were to incorporate market economy elements as well as to strengthen the business capacities of the entities providing the services all in the name of delivering sustainable, quality services to Colombia's underserved population. While Colombia has emerged as a fairly unique case in that it has a mix of successful public and private utilities, some with varying degrees of private sector participation, and also has a number

7 Andres, et. Al. (2008)

8 Andres, et. Al. (2008)

9 Andres et al (2008).

of underperforming utilities (both public and private), two particular characteristics should be taken into consideration:

- The country has had a relatively scattered geographic and demographic development, with many intermediate size cities and small municipalities, as well as 7 large cities with over 500,000 inhabitants. There are over 1,100 municipalities in total, within the context of a unitary state but with high levels of political and administrative decentralization process.
- At the time of the major reforms in the sector, in large cities, and in some of the medium-sized urban areas, public companies provided water and sanitation services, while in the vast majority of the country, local administrations provided these services directly under a highly centralized institutional model with the National Government's financial and technical support.

The sector reforms of the 1990s in the water and sanitation sector in Colombia generated positive results, though clearly there remains work to be done. Through them the country was able to set up a significant number of "Specialized Operators" (the term used for commercially independent utilities established as public companies), public and private, national and foreign, who have been operating part of the water and sanitation systems with greater efficiency and improved management. In larger cities and in some smaller municipalities there has been significant progress in terms of coverage and quality.

The policy framework developed has been sufficiently broad for the emergence and coexistence of several schemes of private participation, corporate development, and competition. These have made it possible, for example, to restructure some public companies at a municipal level so that they are more competitive today, using a range of private-public partnership instruments. This diversity also makes Colombia a special case, particularly in the Latin American context.

Today, Colombia presents us with a nearly unique case of activities in the WSS sector. Currently, combining operations, concessions, and ownership, the private sector is active in water and sanitation services of 139 municipalities, representing 35 percent of the urban population in the country. A group of 6 international specialized operators manages 21 municipalities while the remaining 118 are operated by small and medium national groups. More importantly, perhaps, is that unique feature of the Colombian experience – often overlooked – is that the government utilized the public-private tool as an instrument to address the more complicated cases, places in the country where traditional approaches had not succeeded. Cities with well developed and functioning public utilities (like Bogota or Medellin) were not the focus of the

government's approach. Colombia has multiple examples of successful arrangements with the private sector in some of the most underdeveloped regions of the country.

As a result of such diversity, the case of Colombia presented in this book serves as an example for successful reform and improvements in service provision for systems under very different initial conditions. It is rarely the case that a single country can present sufficient observations to analyze and evaluate the different models for water provision. In general, and particularly in the Latin America and the Caribbean region, models for service provision are concentrated in perhaps a few private operators, and for the rest service provision is the responsibility of either larger public entities, municipalities or usually some combination of the two. The difficulty of performing a cross country analysis is further intensified by the lack of consistent data. Colombia serves as both an incubator and a laboratory for different models and thus provides observation points necessary for a comparative analysis of performance. Consequently, Colombia serves as a unique microcosm that enriches the global debate about forms of water provision and provides successful experiences for a wide range of alternatives.

By providing an analysis of the country's experience, this book uses the Colombian case to illustrate how a series of well thought policy reforms that create incentives for efficient service providers, can radically transform the dynamics of a highly politicized and underdeveloped sector. We show that:

The transformation of sector policies has led to a significant number of municipalities in the country currently having specialized operators (be they public or private) for the water and sanitation systems. This process has led to greater efficiency and better management and to significant improvements in coverage and quality of services.

The historical account of the country's institutional and regulatory framework within a broader decentralization process led to a fertile environment in which private participation materialized. The institutional reforms that Colombia undertook during the 1990s in the water supply and sanitation sector in its attempt to adopt elements of a market economy and more business-oriented practices in the provision of services led to a one-of-a-kind transformation in the water sector that may serve as an example for other developing countries. Moreover, the analysis highlights the importance of normative and regulatory processes in promoting private sector participation. The process has led to greater efficiency and better management and to significant improvements in coverage and quality

of services. Additionally, while much work remains to be done, new resources for investment in the sector became available through the establishment of tariff methodologies and increased transfers to municipalities. Currently the country has a framework of laws, regulations, and sector policy that has stimulated the generation of reliable information for the sector, which defines the setting of tariffs for services based on their production costs, sending adequate signals to rationalize consumption, with positive environmental impacts, and making it possible to program the extension of systems' capacities with efficiency criteria.

There is no unique model to improve service provision through private participation. Different initial condition, call for different choices and solutions to service provision.

By providing a more nuanced view of private participation through the discussion of eight case studies, we illustrate how private sector participation occurred and more importantly, highlight the lessons learned from each. Chapter Two provides a more tangible and specific account of the Colombian experience with respect to the different approaches to private sector participation in the water sector. For instance, the case studies show that policies promoting private sector participation in the provision of public services should carefully consider relevant economic, political, and social factors. Each case study depicts a particular set of lessons learned, which we hope will trigger a discussion on effective ways to promote institutional reform sector participation in other countries and regions. A few conclusions mentioned in this section include the importance of the collaboration between state and private entities in order to achieve optimum efficiency indexes, the role of institutional, regulatory, and legal frameworks in ensuring transparent private sector participation, and the impact of effective management and operational practices in the communities of beneficiaries on the development of a regional process.

Private sector participation is associated with higher levels of output, employment, efficiency, labor productivity, quality and coverage after the transition period. Number of connections, coverage, and percent of non-billed water and labor productivity also show significant changes in levels between the public and the transition periods. This observation indicates that pre-private reforms were effective in WSS in Colombia.

We present an empirical analysis of private participation in the water and sanitation sector in Colombia. This section measures the effects of private sector

participation from the perspective of both consumers and firms through a systematic methodology that combines operational indicators such as output, input, efficiency, quality, coverage, and prices with financial indicators such as operational costs and revenues. The chapter begins with a literature review of private sector participation and builds upon the already established methodologies to perform a systematic analysis of effectiveness based on a set of reliable performance indicators. In doing so, it assesses private participation processes in three different phases: (i) solely public participation prior to PSP; (ii) transition between public and private; and (iii) private participation period, using the utility's initial performance as "counterfactual" to evaluate the interventions that followed.

The analysis presents short- and long-term results, as well as growth rates of each indicator in an attempt to isolate and measure the effect of each intervention. The analysis also evaluates the introduction of private participation at the local level, mindful of the fact that such arrangements within utilities evolve over time, often extending to different municipalities. Finally, based on a sample of 118 cities representing a total of 77 utilities that experienced some form of private intervention between 1995 and 2006, we show that private participation is associated, overall, with higher levels of output, productivity, efficiency, and quality of services. More significantly, we demonstrate that the Colombian case counter-argues previous studies on private sector participation which concluded that private intervention results in fewer jobs.

The Colombian case is a valuable tool to identify the necessary elements for effective public-private partnerships which lead to improved basic services. In this sense, Colombia can provide policy makers with a reference point with which to evaluate their plans and policy recommendations in the water and sanitation sector. In any case, it is important to mention that the process of private participation in Colombia, as in any other country, is far from being homogenous across utilities and across municipalities. We recommend that an assessment of the benefits and drawbacks of private participation should seriously take into account the circumstances at the regional and local level.

Furthermore, the book sheds some light on how to address the main challenge for the future which may be to attract specialized operators to the smaller municipalities which do not currently have them. For that purpose in Colombia, for example, over the last two years, the policy framework has been focused on promoting the sector's development, by using the departments as the intermediate institutional level between the National Government and the municipalities, to formulate programs with regional impact and promote comprehensive investment plans.

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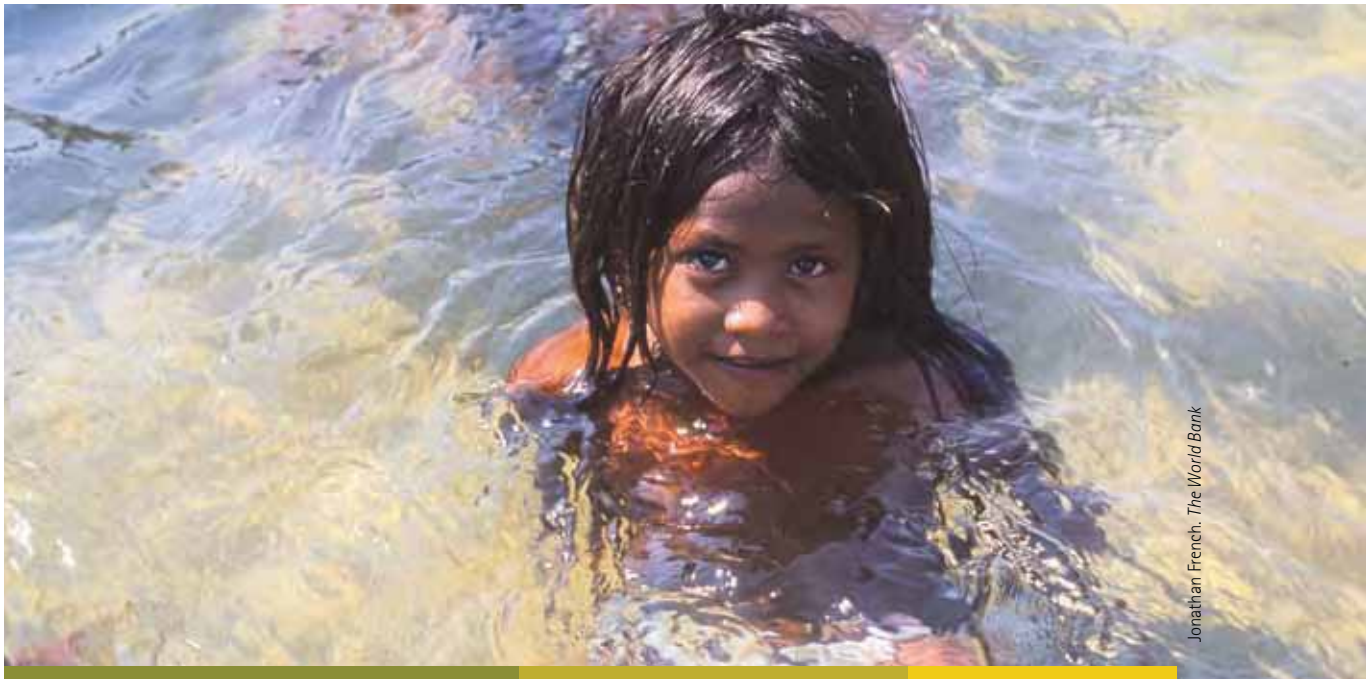
Institutional Reforms in the Water Supply and Sanitation Sector in Colombia



In the 1990s Colombia implemented a series of institutional reforms in the water supply and sanitation (WSS) sector, reforms which were primarily designed to incorporate market economy elements and which tended to strengthen the business development of the entities providing services.

Overall, though far from complete, the implemented reforms should be considered successful. For that reason, the main purpose of this chapter is to share and disseminate the lessons learned by describing the institutional reforms which took place in Colombia, with special emphasis on the norms, regulations, financial mechanisms, and sector policies that have made it possible to markedly improve the coverage and quality of basic services to Colombia's population.

The chapter first presents the background and context associated with the reforms and includes considerations of the sector model applied in the country for most of the 20th century. Second, the chapter describes the institutional situation as defined by the Political Constitution of 1991 and lists the main mechanisms and rules that regulated it and generated the intervention model currently existing in the sector. Third, it continues with a description of the WSS sector in Colombia and the main policies to promote partnerships with specialized operators, public and private, with a special emphasis on the National Government's Corporate Modernization Program (*Programa de Modernización Empresarial*, PME). Finally, as a conclusion and summary, the last section briefly sets forth the main sector achievements of the reform, and defines some actions which policy makers might wish to consider.



Jonathan French. The World Bank

1.1. Background and Context of the Sector Reforms

During the 1990s, Colombia implemented a set of institutional reforms in the WSS sector. The main purposes of these reforms were to incorporate market economy elements as well as to strengthen the business capabilities of the entities providing services. At the time when these reforms were implemented, Colombia's sector presented two particular characteristics that need to be taken into consideration:

- The country had a relatively scattered geographic and demographic development, with many intermediate size cities and small municipalities, as well as 7 large cities with over 500,000 inhabitants. There were 1,122 municipalities in total, under a non-federal state organization that was moving towards a political and administrative decentralization process which would become consolidated in institutional terms with the 1991 Constitution.
- In large cities, and in some of the medium-sized ones, there were public companies providing water and sanitation services and in the rest of the municipalities – the majority of the country – local administrations provided these services directly under a highly centralized institutional model with the National Government's financial and technical support.

Generally speaking, the quality and coverage of service provision were poor. Smaller municipalities had lower coverage and rural areas were significantly underrepresented (Table 1). As urbanization intensified, and investment was concentrated in urban areas in order to sustain or increase urban coverage, smaller and rural municipalities in general, lagged.

In many of the country's important cities, the poor provision of water and sanitation services was critical and although municipal entities made progress in terms of coverage, they faced a financial deficit that caused some to become effectively insolvent. These companies also presented deficient indicators with respect to management, pointing towards administrative inefficiencies in their processes.¹⁰

Table 1. Coverage in 1993

Municipalities Population Range	Number of Municipalities	Water Coverage (%)			Coverage of Sanitation System		
		Total	Urban	Rural	Total	Urban	Rural
>500,000	7	96.9	97.5	64.8	88.1	89.0	44.4
100,000 – 500,000	48	88.8	94.9	47.5	75.9	84.1	19.7
50,000 – 100,000	55	78.2	92.3	44.1	56.3	72.9	15.9
25,000 – 50,000	148	63.5	88.7	38.9	41.4	68.5	14.8
<25,000 inhabit.	841	56.5	89.9	39.1	31.0	67.8	11.8

Source: DANE, 1993 census.

The low tariffs and poor physical metering of water (through domestic and bulk water meters) in the country were reflected not only in the low financial sustainability service providers, lagging investments and poor operation of the systems, but also in the high consumption¹¹ together with high indexes of unaccounted for water, resulting in a condition of sector inefficiency that in the literature is referred to as “low level equilibrium”.

The National Government's intervention model in the development of the sector, which prevailed during most of the 20th century, reached its pinnacle with the creation of the Municipal Promotion Fund in 1940, which increased and centralized the resources assigned to the municipalities and Departments with the aim of facilitating municipalities' access to credit under favorable conditions. A sign of the growing intervention of the Central Government was seen when the Municipal Promotion Fund was turned into the Municipal Development Institute (INSFOPAL) in 1950 under the Promotion Ministry which later became

10 In 1993 the Bogota Water and Sewer Company (EAAB) went through a financial crisis; the companies of Cali (Emcali) and Cúcuta would end up being taken over by the Superintendence of Public Housing Services (SSPD); in cities like Cartagena, Barranquilla, Santa Marta, Florencia and Riohacha the companies would be wound down to open the road to private operators; and others would be restructured with some private participation as in Pereira and Manizales.

11 High consumption was illustrated by the significant decrease observed once the tariff formulas were applied and the tariffs were increased.

the Ministry of Development. The main function of INSFOPAL was to finance and carry out water, sanitation, and public waste management projects.

Local institutions were strengthened by the constitutional reform of 1954, when the creation of agencies as legal entities was authorized, along with an independent budget and their own labor and administrative regimes. This made it possible, in some cases, to turn entities into "decentralized institutions" at the municipal level, as is the case of the current water and sanitation companies in large cities such as Bogotá, Medellín, and Cali. At that time, two different systems began operating in the country: the municipal companies in medium and large cities – decentralized from the local government – and those managed directly by the National Government through INSFOPAL, which carried out tasks in the areas of finance, planning, design, construction, operation, maintenance, and management of water and basic sanitation services in municipalities with less capacity to manage their own companies.

Within the framework of the Constitutional Reform of 1968, INSFOPAL was transferred to the Ministry of Health, with the intention of recovering local management and for the first time, promoting the provision of services with market criteria in municipalities with more than 2,500 inhabitants. Smaller municipalities would be the responsibility of the Ministry of Health, through the National Health Institute. Additionally, the National Board for Public Service Tariffs was created with the objective of recovering investment, operation, maintenance, and expansion of the services through tariffs, as well as the policy of favoring the poor through cross subsidies by charging tariffs above costs to commercial and industrial users and below cost to residential users in lower socioeconomic brackets. In 1974, departmental companies (ACUAs) and some municipal ones (*Empresas de Obras Sanitarias*, EMPOs) were created as branches of INSFOPAL with the purpose of improving the low institutional quality to address the deficit in coverage.

These reforms did not generate the expected results; approaches administrative systems did not reach the market objectives, the tariff system fell far short of achieving the cost structure of the companies, and, among other reasons, because of clientelistic practices more focused on electoral results than on technical and administrative considerations.¹² The financial difficulties and poor results of the INSFOPAL model led to its dissolution in 1987.¹³

12 CRA (2002).

13 The coverage in water and sanitation achieved by the INSFOPAL and its 40 branches was lower when compared to the coverage by the state commercial companies at the municipal level. (Betancurt, L. et al. (1985); quoted in CRA [2002]).

The sector's financing responsibility was shifted to the Finance Fund for Urban Development, managed by the Central Mortgage Bank, following the recommendation of the World Bank. As a prerequisite for loans to the sector, the new approach required radical transformations aimed at the elimination of the allocation of resources without counterpart funding and non-reimbursable credits, and the imposition of conditions relating to improvements in the technical and administrative management of the service providers. In addition, the National Government started to transfer regional branches (EMPOs and ACUAs) to the Departments and delegated responsibilities to the municipalities, which then would be in charge of implementing and operating the services. To that end, the National Government transferred the assets without charge and provided subsidized credits to finance debt. This transfer process was only effective in the larger and more sophisticated municipalities: Medellín, Cali, Bogotá, and Manizales. Coordination, planning and technical assistance functions were transferred to the Water and Sanitation Directorate of the Ministry of Public Works and Transport.

Once INSFOPAL was dismantled, the sector entered a transition stage until 1994, when the National Planning Department (DNP) was assigned the function of planning and technical assistance for the sector. This would supplement FINDETER (created in 1989), an entity reporting to the Ministry of Finance which replaced the Finance Fund for Urban Development.



1.2. The Sector's New Institutional Model

The inclusion of financed sustainability elements in the WSS sector, intended to strengthen business development and to improve the sector's efficiency, took place within the framework of an international trend of institutional changes that took a firm hold in Latin America. This framework applied two fundamental principles¹⁴: (i) the definition of a legal and regulatory framework, as well as the design and creation of the institutions in charge of enforcing them, which would precede the process of corporate modernization and, in some cases, private participation; and (ii) the separation of the policy-making functions for the development of the sector from those concerning service operation. This latter differentiation represented a major institutional achievement and remains a core tenant of the government policy. Within the context of the region, Colombia moved forward platform impressively in these two areas.

1.2.1. Overview of Reforms

The 1991 Constitution defined a model of greater decentralization for the provision of services and promoted a shift from an approach based on the direct provision of services by the government to one where the supply is carried out by public or private companies. This new system, in turn, was positioned within an institutional framework based on the division of functions between the national government, in charge of formulating the sector's policy, enforcing rules and

¹⁴ CEPAL (1999).

oversight, and municipalities, responsible for ensuring an efficient supply of the services. General rules for the participation of the private sector in the economy were also formulated at the constitutional level.

This constitutional framework defined specific rules to promote the business development of the sector. Those rules resulted from the passing of Law 142 in 1994, establishing the Residential Public Services Regime in the country. This law established a general framework to transform regulation, control and oversight and to strengthen the spirit of decentralization embodied in the constitution which consolidating service provider companies through business modernization policies and tariff methodologies. These measures focused on recovering economic costs, promoting private participation in the sector, increasing efficiency, and increasing competition, while preserving state intervention tools in accordance with its social aims.

Box 1. WSS Public Services in the Political Constitution of 1991

Section 333.- Economic activity and private initiative are free, within the limits of common good. [...] Free economic competition is a right enjoyed by everybody which implies responsibilities. Companies, as the basis for development, have a social function which implies responsibilities. The state will strengthen the solidarity-based organizations and will stimulate business development. The state, as mandated by law, will prevent the obstructions or restrictions to economic freedom and will prevent or control any abuse by companies or individuals of their dominant position in the domestic market [...].

Section 365.- Public services are inherent to the social purpose of the state. It is the state's duty to ensure their efficient provision to all the inhabitants of the national territory. Public services will be governed by rules dictated by law. They may be provided by the state, directly or indirectly, by organized communities or by private individuals. In all cases the state will regulate, control and supervise those services. [...].

Section 366.- The wellbeing of the population and improvement of its quality of life are the social purpose of the state. The basic goal of the state's activity will be to solve the unmet health, education, environmental sanitation and water supply needs. To that end, public social expenses will have priority over any other allocation in the plans and budgets of the Nation and the territorial entities.

Section 367.- The law will define the competences and responsibilities pertaining to the provision of residential public services, their coverage, quality, financing and tariff scheme which will consider, in addition to cost criteria, those of solidarity and income redistribution. [...] The law will determine the entities with powers to set the tariffs.

Section 368.- The Nation, Departments, districts, municipalities and decentralized entities may grant subsidies, within their own budgets, so that people with lower incomes can pay the tariffs of residential public services covering their basic needs.

Section 369.- The law will define the duties and rights of users, the system for their protection and the way in which they will participate in the management and oversight of the state companies providing the service. It will also define the participation of the municipalities or their representatives in the entities and companies providing them with residential public services.

Section 370.- The President of the Republic will be responsible for defining, according to the law, the general policies for the management and efficiency control of residential public services and through the Superintendence of Residential Public Services, for inspecting and supervising the entities providing the services.

In addition, Law 142 of 1994 established an independent regulator, the Commission for the Regulation of Water Supply and Sanitation (*Comisión de Regulación de Agua Potable y Saneamiento Básico*, CRA), allocated competencies to or different levels of Government, and clearly defined the legal nature of the institutions and entities that would be allowed to provide public services: public service companies (ESPs), set up as public companies under commercial law. The law mandated that all residential public service companies convert to stock companies before July 11, 1996, with the possibility of being state-owned, private, or mixed. In July 1996, a law was passed extending for 18 months the deadline for the transformation of the entities, until December 1997. The law also defined some exceptions concerning industrial and commercial companies at the municipal level, which to that point, had been providing public services and could be turned into ESPs without being required to become stock companies. Additionally, it authorized the creation of community organizations in rural areas and in some specific urban areas. The requirements of this law opened the opportunity for private participation in the sector.

The issuance of the first tariff methodologies by the CRA in 1995 represented one of the main structural and operational reforms in the sector.¹⁵ These methodologies made it possible to recognize the economic cost of providing the service through tariffs. Their application required the generation of reliable

15 CRA Resolutions 08 and 09 of 1995.

technical and economic information that did not exist in the sector, which in turn became an important tool for regulation and control.

One highly relevant element is that the technical application of the methodologies partially isolated the definition of the tariffs from the country's political context, something which created an opportunity for financial strengthening of companies. This process was reinforced when the approach of demand-based cross subsidies was rationalized through a "tariff transition" process whereby the percent subsidized was reduced with the imposition of maximum caps.

This regulatory framework was complemented by Law 60 of 1993 and Law 715 of 2001 – the General Revenue-Sharing System (*Sistema General de Participaciones*, SGP), a tax-sharing system which determined the distribution of the resources that the national government is required to transfer to the municipal entities, part of which is allocated directly to the WSS sector. In this way, the decentralization of the responsibility of providing the population with access to services was accompanied by a significant increase in the resources assigned to the sector in the form of transfers.

Under this institutional and regulatory context, the national government implemented an active policy to foster the development of private sector participation which can be divided into three stages: (i) in the first half of the 1990s the national government supported the structuring of partnerships with specialized operators in a small number of municipalities where the service provision was critical; (ii) by the mid 1990s the National Government formulated an explicit policy for private participation and set up a Private Participation Management Area in the National Planning Department (*Departamento Nacional de Planeación*, DNP), with the aim of organizing a broader and more solid program which would standardize the parameters for the participation of the national government in this type of operation (as well as in other sectors); and (iii) in 1998, the area of WSS of the Private Participation Management Area of the DNP was eliminated and the Corporate Modernization Program (PME) was set up in the Ministry of Economic Development, thus adjusting the institutional framework of the sector to take ownership of the policies directed at its promotion.¹⁶

The regulatory framework developed was comprehensive enough for the co-existence of different schemes for private participation, business development and competition. The following aspects of the policy are worth highlighting: (i) freedom to enter the market (market competition); (ii) municipality/ESP agreements under different schemes (operation, operation with investment, construction and operator); (iii) partnership schemes; (iv) outsourcing of processes with private participation (an approach used in Bogotá); and (v) community organizations.

¹⁶ DNP (1997).

Box 2. The *Planes Departamentales de Agua*

Despite steps taken to incentivize greater private sector participation, attain economies of scale, and achieve greater regional integration through PME and other reforms, in 2008 MAVDT took an additional step in this direction through the introduction of *Planes Departamentales de Agua y Saneamiento* (Departmental Plans for Water and Sanitation) with the goal of realizing greater economies of scale and less fragmentation of resources.

With the ultimate goal of improving water and sewage coverage, quality, and efficiency of provision of service, the *Planes Departamentales* are designed specifically for the conditions in each individual Department and focus on four key elements: (i) coordinating agents from all levels, from municipal through national, to improve coordination and provide technical assistance expertise at the departmental level; (ii) transforming the business environment within the sector, thereby improving legitimacy, financial viability of the providers, and the transparent application of cross subsidies within the solidarity framework; (iii) incentivizing greater regional management of water and sanitation services, thereby achieving greater economies of scale and regional agreement on the use of financial resources to the greatest benefit of the end user; and (iv) creating conditions for the entrance of specialized operators and allowing users to benefit from reduced costs.

Resources for the *Planes Departamentales* are jointly contributed by the Department, the municipalities, the Regional Autonomous Corporations (*Corporaciones Autónomas Regionales*, CARs), occasionally by multilateral institutions, and the majority coming from the National Government through SGP transfers. Once an agreement is signed between the Department and MAVDT, the funds are held within a trust fund, or *Patrimonio Autónomo*, in distinct accounts, until they are assigned to a specific end purpose whereupon they are transferred directly to contractors or utilities. The key elements of this framework are that: (i) the Department plays a greater role in managing an interinstitutional, regional approach to the provision of water and sanitation services; (ii) once committed to the *Patrimonio Autónomo*, a standalone legal entity, funds cannot be withdrawn for other uses – critical for the long-term viability of service provision and investment, especially with changes in local political leadership; and (iii) funds are sent directly to the contractors or ESPs for specific works rather than through the departmental or municipal governments.

Municipalities which participate in the *Planes Departamentales* have priority access to additional national and departmental funding, releasing municipal resources for other uses. As of June, 2009, 691 water projects totaling COP\$1.7 trillion (US\$8 million in 2009) are underway within the framework of *Planes Departamentales*.¹⁷ A report by *Unión Temporal Centro Nacional de Consultoría-ECONOSUL* found that 80% of municipalities believed that

17 Secretaría de Prensa, Presidencia de la República de Colombia, May 29, 2009. <http://web.presidencia.gov.co/sp/2009/mayo/29/12292009.html>.

Planes Departamentales would have a positive or very positive effect on improving delivery of services and access to resources. The majority of municipalities (61%) planned to take part in the framework, or have already implemented a *Plan Departamental*. Only 2% of municipalities did not plan to take part in the framework.¹⁸

1.2.2. Institutional Organization of the Sector, Regulation, and Control

Since 1994 Colombia has developed a scheme of “multi-regulators” with competencies scattered in different entities and territorial levels under a decentralized structure for the provision of services. This structure demands a high level of inter-institutional coordination and clear policies to avoid conflicts in environmental, technical, water quality and tariff objectives.

The Ministry of Environment, Housing and Territorial Development (*Ministerio de Ambiente, Vivienda y Desarrollo Territorial, MAVDT*) implements the sector policies and national government’s programs, promotes the efficient management of the service providers, and defines the technical rules for the sector. The Ministry of Social Protection, together with the MAVDT, defines the minimum quality parameters for water supply and supervises them through its health offices. Likewise, departments, through their Health Secretariats, carry out water quality tests in their municipalities, and the Superintendency of Residential Public Services (*Superintendencia de Servicios Públicos Domiciliarios, SSPD*), in its role as service provider overseer, takes part in monitoring compliance with these parameters.

In addition, the autonomous regional corporations, as environmental control entities at a regional level, implement environmental plans and programs and renewable natural resource conservation plans. They define the quality goals for the watersheds within their area through the Watershed Administration and Management Plans (*Planes de Ordenamiento de Manejo de Cuencas Hidrográficas, POMCA*), grant water concessions and define and manage – following MADVT rules – the retribution and compensation fees for water usage. Within the framework of the POMCA, sanitation companies, in turn, develop “Sanitation and Wastewater Discharge Management Plans” (*Plan de Saneamiento y Manejo de Vertimientos, PSMV*) that must be approved by the corresponding environmental authority.

18 Unión Temporal CNC – ECONOSUL (2009).

It is important to note and make clear that the functions of oversight, inspection, and control of service providers assigned to the SSPD are institutionally separate from the economic regulation function carried out by the President of the Republic and delegated to the Commission for the Regulation of Water Supply and Sanitation (*Comisión de Regulación de Agua Potable y Saneamiento Básico*, CRA). While the CRA issues general rules on matters like tariff methodologies, definition of quality parameters in the provision of services, methodologies to evaluate management, and efficiency of the providers and regulation of monopolies and markets in general, the SSPD supervises the adequate application of the aforementioned rules by the providers and manages the sector's Unified Information System.

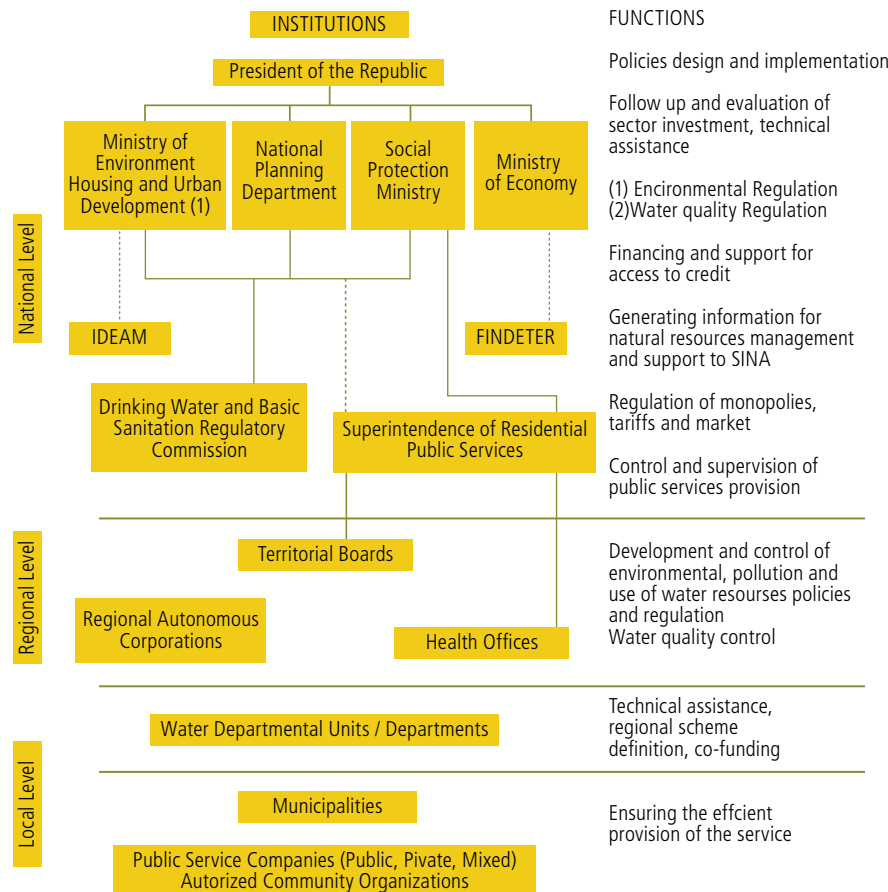
The CRA is a special administrative unit, with technical autonomy, attached to the MAVDT.¹⁹ The Commission, as regulatory decision maker, is made up of four full time Commissioned Experts, appointed by the President of the Republic for defined periods with staggered end dates, and by three ministers: the Minister of Environment, Housing, and Urban Development (the chairman), the Social Protection Minister, and the Director of the National Planning Department.²⁰ The Superintendent of Residential Public Services also sits on the Commission, but has no vote and decisions are made by majority vote. In this sense, the regulatory decisions of the Commission occur within a framework of limited independence.

The arguments in favor of independent regulatory institutions prevail in the international debate. In the case of Colombia, experience has shown both positive and negative aspects of a "relative independence" scheme. On the one hand, the presence of the National Government through the participation of the ministers has guaranteed a high degree of coordination of the regulation with sector policy and with different normative developments. In fact, it could be said that the staged regulatory development of the sector has been the result of such an approach. On the other hand, the mixed system of the Commission has generated a perception of sufficient independence to dilute the political impact of the significant tariff increases experienced by most users in the country that took place between 1996 and 2005. By the mid 1990s, and even today, it was usual to find legislative initiatives in Congress to reduce the independence of the Commission or even eliminate it, as well as political control subpoenas, not only for ministers but also for the Executive Officer of the CRA, situations which in most cases result from the contemporary political circumstances of the country.

19 The CRA does not have budgetary autonomy.

20 The Ministers can delegate their participation on the Vice Ministers.

Figure 1. Institutional Regulation and Control Scheme of the WSS Sector



Source: DNP (2005)

The municipalities and the National Congress have a "residual regulation" capacity on tariff issues. On the one hand, municipalities, at the time of assigning the services to an operator through a bidding process, can arrange a "contract" tariff as long as this has been part of the selection criteria in the process. The mayors and the municipal council are in charge of establishing the subsidies and "solidarity" contributions, according to the strata of the users (which in Colombia are defined by a range of one to six, with one being the poorest), within the municipal budget process and in accordance with the resources available. On the other hand, the maximum percentage of subsidies granted to low strata users are defined by law and can only be modified by the National Congress. For example, the "tariff transition", which adjusted subsidies up to the maximum level, was intended to end by December 2001, but the term was extended by National Law

until December 2005. In addition, the maximum subsidy for users in stratum one, which Law 142 of 1994 had established at 50 percent, was increased to 70 percent by Law 812 of 2003 (National Development Plan 2003–2006).

The division of labor of the sector's regulation and control in Colombia is a special case within the context of Latin America. As can be seen in Table 2, in other countries, supervision is carried out by the regulator, which in some cases is at the national level – as in Colombia – while in other cases (particularly in federal systems) it is at the provincial level. Furthermore, the application of tariff methodologies issued by the regulators, the approval of tariffs, and the opportunities for appeal, correspond to different institutions in the different countries.

Table 2. Institutional Responsibility for the Application of the Tariff Methodology

Country / City	Regulator	Institutional Responsibility			
		Application	Approval	Appeal	Supervision
Argentina					
Province of Buenos Aires	ETOSS	Provider	Regulator	Water Resources Undersecretariat	Regulator
Province of Cordoba	ERSEP	Provider	Executive	Provincial Government	Regulator
Bolivia	SISAB	Provider	Regulator	Supreme Court General Superintendent	Regulator
Brazil					Regulator
Ceara	ARCE	Provider	Municipality	-----	
Pernambuco	ARPE	Regulator	Regulator	None	Regulator
Sao Paulo	None	Provider	Provider	Provider	Provider
Chile	SISS	Provider	Regulator	Arbitration	Regulator
Colombia	CRA	Regulator	Municipality	Administrative Jurisdiction	SSPD
Costa Rica	ARESEP	Regulator	Regulator	Administrative Jurisdiction	Regulator
Nicaragua	INAA	Regulator	Regulator	Arbitration	Regulator
Panama	ERSP	Regulator	Regulator	None	-----
Paraguay	ERSSAN	Regulator	Executive	None	Regulator
Peru	SUNASS	Regulator	Municipality	Administrative Jurisdiction	Regulator
Uruguay	URSEA	Regulator	Executive	Administrative Jurisdiction	-----

Source: Fernández (2006)

Coordination within the WSS sector remains complex. The sector is highly decentralized, and the National Government allocates responsibility for the service and transfers resources to the municipal level, further enforcing the scattered sector structure and incomplete process of utility transformation. In spite of the significant progress, nearly half of the country's 1,122 municipalities continue to provide the services directly and not through ESPs as mandated by Law.

Bearing in mind the main objective of creating a more consolidated sector with efficient companies, where a better use of economies of scale is made through regional schemes for the provision of services, it should be noted that the country's arrangements to regulate the structure of the industry are fragmented. Additionally, this structure results not only from regulation of the business development policy of the National Government, but also from the application of control by the SSPD, which affect the policy decisions that the municipalities and departments may adopt.

Though CRA has the functions of merging or dividing companies when it considers that this is technically appropriate, and of ordering the liquidation of inefficient public providers, it has not developed the general rules to put these functions into practice. The SSPD, on the other hand, has the power to place providers, in receivership, in order to administrate or liquidate them. At the same time, the MAVDT has been promoting business modernization with technical and financial support to the municipalities in what are usually complex and long processes that require the consolidation of a local political consensus involving the mayor, the municipal council and the community. The mayor has to request municipal council for the approval of powers to hand over the provision of the services to a third party or to create a regional company together with other municipalities, as well as to commit future budgetary resources to guarantee the financial success of the projects.

With respect to control functions, the SSPD is in charge of the inspection and oversight of the entities that provide public services. The following are some of its functions: (i) controlling and evaluating the enforcement of the law's regulatory framework and in the rules issued by the regulatory commissions; (ii) supervising and controlling compliance with the law and administrative acts, to the extent that their compliance (or non compliance) affects particular users directly and immediately; (iii) penalizing violations; (iv) overseeing and controlling compliance with agreements between public service companies and their users; (v) establishing consistent information and accounting systems; (vi) overseeing the use of subsidies which are mandatory for low income users; and (vii) evaluating companies' financial, technical, and administrative management.

While the control of utility companies is vested in the SSPD, the Constitution of 1991 and Law 142 of 1994 emphasize the participation of users in the management and oversight of the companies. Such participation is embodied in Social Development and Control Committees. These can propose programs to solve failures in service delivery, request modifications in the decisions concerning stratification, and collaborate in general with the Superintendence of Residential Public Services in the oversight of each company's management.

Moreover, the presence of public financing sources and of state companies in the sector causes the auditing agencies of the public sector to play a fundamental role in the sector's control. In recent years, due to the concern regarding an inefficient use of the resources transferred by the central government to municipalities through the General Revenue-Sharing System (*Sistema General de Participaciones*, SGP) and the limited responsibility of the SSPD in controlling the municipalities as territorial entities, the Public Prosecutor's Office (*Procuraduría General de la Nación*, PGN) and the Office of the Comptroller General of the Republic (*Contraloría General de la República*) have been more actively involved. In 2006, the Inter-Institutional Board of Achievements (*Mesa Interinstitucional de Logros*) was created in the WSS sector under the leadership of the PGN with the participation of the various regulatory and control agencies. This Inter-Institutional Board has been exercising a comprehensive control of the departmental improvement plans, with special emphasis both in business modernization and the adequate use of public resources.

This institutional framework reflects the evolution of the role played by the state in the development of the sector. This role targets the strengthening of regulatory and control institutions, focused not so much on the isolated definition of tariff schemes as on seeking efficiency in the provision of the services, improvements in productivity, coverage, and quality, introducing market criteria, eliminating barriers for competition, and preventing the abuse of dominant positions and discriminatory or unfair practices.

1.2.3. Development of Regulation within the Framework of the Reforms

The analysis of the Regulatory Framework of the WSS sector must take into account its context, in particular during the first half of the 1990s. At the time, there was little consistency in the accounting of the companies and municipalities which provided services directly. That made it practically impossible to have any certainty concerning the cost of service supply. Moreover, there was no culture of assessment of the assets and the information available on the condition of the infrastructure

was very limited. This made it quite difficult to develop an initial regulatory approach for asset replacement. Another fundamental aspect was recognizing the poor financial situation of most service suppliers as a result of inefficiency and poor business management.

The combination of these factors motivated the gradual development of regulation starting in 1995 (see Table 3). The paucity of available information and its poor quality made it almost impossible to demand a completely transparent cost allocation or to apply comparative efficiency criteria. Additionally, because of their weak financial situation, utilities were not able to meet the efficiency requirements in the short term, but rather made it necessary to move gradually towards their achievement.

Table 3. Evolution of the Regulatory Framework

	First Stage (1995–2003)	Second Stage (2004–2008)	Third Stage (2009 onwards)
Focus	<ul style="list-style-type: none"> Financial strengthening of providers 	<ul style="list-style-type: none"> Efficiency in administration and operation components Transparency in the investment component 	<ul style="list-style-type: none"> Efficiency in the investment component Service quality Structure regulation Targeted subsidies
Instruments	<ul style="list-style-type: none"> Tariff methodologies to reduce the gap between tariffs and costs of service supply Methodologies for plans and evaluation of management and results 	<ul style="list-style-type: none"> Tariff methodology: comparative efficiency parameters for management and operation costs Replacement of assets plans instead of value of new ones Explicit definitions of useful life and infrastructure components 	<ul style="list-style-type: none"> Tariff regulation: introduction of criteria for investment component. Rules on "quality, discounts, repairs" Development of regulation for mergers and liquidation of inefficient public providers
Results	<ul style="list-style-type: none"> Rational consumption Improved coverage and quality Generation of sector information 	<ul style="list-style-type: none"> Higher efficiency of companies Improvements in quality and coverage Consolidation of Unified Information System 	<ul style="list-style-type: none"> Improved economies of scale Coverage consolidation Improvement in a wider set of quality indicators Business modernization throughout the country

Source: DNP (2007), "Bases del Plan Nacional de Desarrollo 2007–2010" (Basis for the 2007–2010 National Development Plan).

As mentioned above, in a first stage, the tariff methodologies issued by the CRA in 1995 focused on standardizing basic accounting processes. This included forcing the providers to organize their accounting and define a "reference cost" for the provision of the service, based on the accounting information on the operation and administration expenses of each company, as well as on the submittal of an expansion investment plan and an asset replacement value based on their "brand new value". In this way, the financial recovery of many providers was prioritized, as well as the generation of sector information, along with improving management, coverage, and quality of services. Additionally, the increase in tariffs – which were too low at the time the methodologies were applied – generated price signals that were economically more efficient and resulted in significant decreases in consumption.²¹ In addition to this positive environmental impact, the decrease in consumption made it possible to postpone investments in expanding the capacity of the systems, thus limiting the cost increase of the service for all users.

The second regulatory stage began with the tariff methodologies issued in 2004.²² These were more demanding in terms of efficiency and more transparent with regards to cost allocation, in order to make it easier to control the implementation of the investments. The administrative cost (fixed charge) and the operation cost were limited in the new methodologies with an efficiency parameter resulting from the estimate of a comparative efficiency model with information from the existing companies. An expansion investment plan is laid out as in the previous methodology and, instead of calculating the value of new assets, the companies must submit a replacement plan for a finite period (See Box 2). The process of financial strengthening and generation of information that resulted from the first regulatory stage was expected to make it possible for the companies to respond adequately to the higher efficiency demands and to optimize their investments.

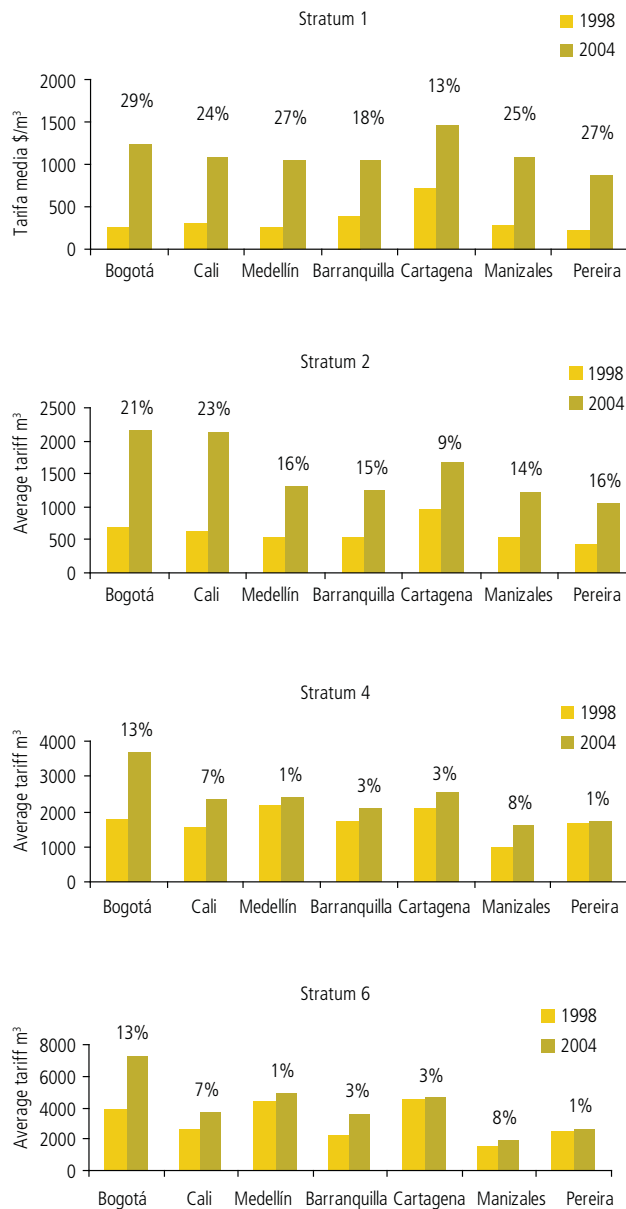
The application of the comparative efficiency model across companies has had, overall, a positive impact. The model has led to reductions in the administrative and operation costs that are passed through to the tariff and to improvements in the quantity and quality of information reported by companies, including greater accuracy and consistent criteria for the accounting of expenses and the assessment of technical and commercial variables. In addition, the assessment of relative efficiency scores has generated a competitive environment, as companies do not want the recognition of their expenses as passed through to the tariff reduced, nor the negative impact on their reputation among users that

21 Ángel, J. and Rozo, J. (2002), compiled the information on consumption by stratum, showing significant reductions between 1997 and 2002, and estimated price-demand elasticities of around -0.24.

22 Resolution CRA 287 of 2004.

would result from the disclosure that they are not as efficient as other companies in the country.

Figure 2. Real Average Annual Variation of the Tariff (*) for Water and Sanitation 1998-2004



* Basic average tariff (value per m³ including fixed charge and consumption of 20 m³/user/month).

Source: SSPD, DNP – DDUPA Calculations

Regulation is expected to evolve in the future towards an approach where it will have a greater effect on asset management and foster increased efficiency in investment. This would be complemented with the development of the CRA responsibilities concerning "structure regulation" in issues such as provider mergers and the liquidation of inefficient public providers, with the aim of achieving the aggregation of utilities and a better use of economies of scale.²³ It may be necessary to introduce quality parameters in tariff methodologies and to improve the targeting of subsidies through the adjustment of parameters that may be modified by the CRA, such as the basic consumption level (maximum consumption that can be subsidized) and the conditions to grant subsidies to Stratum 3 users.

Box 3. Structure of Tariff Methodology

Since 1995 a "mean long term cost" approach has been adopted, as well as a two-part tariff: (i) a fixed charge (\$/user) equal to the Mean Administration Cost (*Costo Medio de Administración*, CMA), which results from dividing the administration costs among the total users; and (ii) a consumption charge (\$/consumed m³), which results from the sum of a Mean Cost of Operation (*Costo Medio de Operación*, CMO) plus a Mean Investment Cost (*Costo Medio de Inversión*, CMI), expressed as a cost by cubic meter produced. In 2004 the mean cost for environmental fees (*Costo Medio Tasa Ambiental*, CMT) was disaggregated as an independent component. This is a cost to be paid by the companies to the regional environmental authorities (fees for the use of the water and retribution rates for wastewater discharges). Thus, the general expression of the formula is the following:

$$\text{Tariff} = \text{CMA} + \text{CMO} + \text{CMI} + \text{CMT}$$

The methodology contains elements of regulation by comparative efficiency (*yardstick competition*) in the CMA and CMO components (since 2004), and of regulation by rate of return (*ROR regulation*) in the CMI.

Administrative and operation costs are broken down into "comparable costs" between companies and "particular costs" for each company, which reflect conditions out of the companies' control, such as local taxes, energy consumed in the distribution system (defined by the topography and a market price) and chemical inputs (defined by the quality of the available water source). "Particular costs" are transferred directly to the tariff (*pass through*) with some technical criteria for efficiency.

23 DNP (2006).

With the comparable operation and administrative costs reported by the companies, efficiency frontiers are estimated with the DEA (Data Envelopment Analysis) methodology, aimed at minimizing costs. The output in the administrative costs model is the users of water and sanitation, and in the operation costs model, it is the amount of water produced. Both models are controlled for other variables which might affect cost. The companies whose costs define the efficiency frontier transfer the total of their costs to the tariff. The rest of the companies have a restriction on the costs they can transfer to users with their relative efficiency score, which is lower than 1.

The CMI has three components, which include the Present Value of Investments in replacement, expansion, and rehabilitation of assets (VPI_{RER}); the existing Assets Value which has not been recovered (VA), approximated by their book value or by calculating their linear depreciation, and the Mean Cost of Investment in Land (CMIT), as the purchase value of the asset not including its appreciation, over the present value of the demand (VPD).

To obtain the CMI expressed in cubic meters of water, the VPI and the VA are divided by the present value of the demand (VPD), projected over a time horizon equivalent to the useful life of the system, which is established based on the useful life defined by the CRA for each kind of asset. The projected water demand is affected by the maximum "Unaccounted for Water Index" recognized by the CRA, and it is brought to present value with the same discount rate used when calculating the VPI. This rate has to be the weighted average cost of capital (WACC), also regulated by the CRA. Thus, the expression to calculate the CMI is the following:

$$CMI = \frac{VPI_{\text{RER}} + VA}{VPD} + CMIT$$

The VPI is calculated over a 10 year investment planning horizon. Companies with fewer than 25,000 users can apply a horizon of 5 to 10 years, and those with fewer than 8,000 users have the option of applying, for the sake of simplicity, a table of pre-established values according to the water demand and its growth. Investments must follow a principle of prioritization, taking into account coverage targets, vulnerability, and reduction of losses.

1.2.4. Sector Financing within the Framework of the Reforms

The resources available for investment in the WSS sector come from different sources and have increased significantly over the last 15 years within the framework of the reforms. Annual resources are estimated to have quadrupled in real terms since 1993 and amounted to US\$ 1,109 million in 2007, reflecting two central facts (Table 4): (i) the strengthening of the sector's decentralization, with the substantial increase of transfers from the Nation to

the municipalities²⁴; and (ii) the tariffs paid by users have become an important source of funds, as a result of the application of the tariff methodologies which began in 1996.²⁵ Projections of sector financing with the new *Planes Departamentales* are expected to be significantly greater.

Table 4. Annual Resources for Investment in WSS in Colombia by Source – 2007

Source	Annual Investment Resources (million dollars)	Sources Share (%)
Transfers (SGP)	412	37.2
Tariffs/ 1	358	32.3
MAVDT – Under Ministry of Water Supply and Sanitation/2	175	15.8
Direct royalties /3	100	9.0
Regional Autonomous Corporations/4	53	4.8
National Royalties Fund /5	10	0.9
Total	1,109	100.0

/1 Estimate based on the free cash flow of 80 companies of different sizes. An average for 5 size ranges was estimated and applied to the rest of municipalities in the country.

/2 The value corresponds to the annual average of what is allocated in the Law for the National Development Plan 2007-2010 for the four year period. In 2007 additional previous commitments will be executed.

/3 The value corresponds approximately to 15 percent of the total direct royalties received by departments and municipalities in 2005.

/4 The value corresponds to the CARs average annual investment budget between 2004 and 2006, for sanitation and wastewater treatment.

/5 The value corresponds to DNP estimates.

Source: DNP

As can be seen in Table 4, apart from the tariffs and transfers from the central government to the municipalities, other sources of investment funds include ad hoc contributions from the central government, currently through the sector programs of the MAVDT, royalties that municipalities and departments receive for the exploitation of natural resources, part of which by law must be allocated to investment in WSS, contributions from the CARs (regional environmental authorities) which collect revenues through environmental fees and can invest in sanitation and wastewater treatment infrastructure, and finally, resources of the

24 Law 60 of 1993 and Law 715 of 2001 (General Tax-Sharing System -SGP).

25 Tariffs are an important source of funds for investment in mid sized and large cities.

National Royalties Fund managed by the National Planning Department, to which territorial entities may apply for funding of projects in specific regions,

The relative importance of these sources of funding is evolving. While the resources directly contributed by the central government have fallen in accordance with the decentralization process when compared to 1993, they have an important strategic value since to a great extent they are applied to structured projects as part of the business transformation process. Moreover, since 2003, there has been a tendency to increase budget allocations by the National Government through the MAVDT, reinforced in the 2007–2010 National Development Plan that was approved by the National Congress in June of 2007.²⁶ Also, the rules have introduced a tax incentive²⁷, with an income tax exemption for companies investing in regional systems outside the municipality where they are established.

The SGP transfers from the Central Government to municipalities are estimated to finance around 40 percent of the investment in water and sanitation, but deficiencies can be seen in their application.²⁸ Among these are inefficiency and lack of coordination in comprehensive investment plans, partly because they are carried out directly by the municipalities even when there is an operator providing the service; the segmentation of the resources due to annual budget effectiveness and lack of dynamic access to credit and the capital market that generate scattered and incomplete investments; geographic atomization of resources; and finally, the mechanism for distribution to the municipalities is not directly related with the sector's local needs and lacks an incentive scheme for the adequate use of resources and business transformation in service supply.

The atomization of the SGP allocation is made evident by the fact that 768 municipalities with fewer than 25,000 inhabitants, representing only 19 percent of the population, receive 46 percent of the resources. Although in the small municipalities the rate of coverage is low, the number of people to serve is higher in the medium-sized cities (between 25,000 and 500,000 inhabitants). Meanwhile, the eight cities with over 500,000 inhabitants receive 19 percent of the resources, but these have higher rates of coverage and have the ability to make a greater tariff effort.²⁹

26 The annual budget of the National Government allocated to the WSS sector at the beginning of the 1990s was approximately US\$190 million, then it fell to levels close to US\$50 million in the second half of the decade. Beginning in 2003 the contributions have increased and between 2007 and 2010 they will be US\$ 175 million a year.

27 Despite two decrees of 2003 for the application of this exception, now 7 years later has not been used.

28 Silva, J. and Rozo, J. (2005).

29 Silva, J. and Rozo, J. Ibid

Additionally, there is a lack of an adequate regional balance of the different sources of funds available for the sector, when considering the SGP, tariffs, and royalties. In municipalities with a surplus, this situation might be leading to an investment bias that is not in line with the water and sanitation investment priorities at a national level. Also, this could generate incentives for some municipalities to avoid making adequate tariff efforts.

Adequate sector financing requires access to long term credit and capital. The larger companies have access to long term financing, including through the issuing of bonds. However, little use is made of the national financial system in the sector, which remains highly dependent on state contributions (mainly through the SGP) to generate positive cash flows for most of the providers in the country. This situation demands the design of an explicit strategy for access to credit for the sector as a whole, where the Multilateral Banks could play an important role (see Box 3).

Box 4. Credit from Multilateral Banks

The sector's credit from multilateral banks has traditionally been concentrated in large cities, and those credits encompassing a wider geographical area have been taken through national agencies.³⁰ Since 2004, the policy of access to credit for the sector has shifted so that the sectoral indebtedness was produced regionally, with the endorsement and guarantee of the Nation. Thus, credit operations were structured in the departments of La Guajira, Magdalena, and Cesar with the World Bank and the *Corporación Andina de Fomento* (CAF) to finance the Water and Sanitation Departmental Plans. These credit operations have been useful in coordinating the flow of funds to the sector, which have been scattered across different sources, and to arrange them as a future flow of fiscal funds to address short term comprehensive investment and business modernization plans.

Credit and cooperation from multilateral banks 1984-2007 (million US\$).

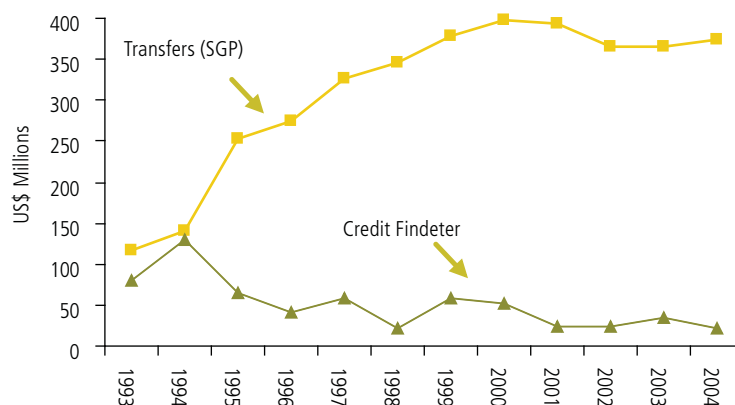
30 The four credits at a national level that focused on medium and small municipalities were arranged with the World Bank: (i) US\$150 million, agreed in 1988 and implemented by the Urban Development Fund; (ii) US\$40 million, as part of the "credit for the development of urban infrastructure", implemented by FINDETER; (iii) US\$40 million in 2001 to finance the MAVDT's Business Modernization Program; and (iv) US\$70 million in 2005 to finance works scattered all over the country, as part of the regional investments of the National Development Plan 2003-2006.

1. Institutional Reforms in the Water Supply and Sanitation Sector in Colombia

Territorial Level	World Bank	IADB	Other	Total	Beneficiaries
LARGE CITIES	402.0	325.2	8.5	735.7	Cucuta (WB, 1984); Barranquilla (WB, 1985), Cali (IADB, 1987), Bogota (WB 1984 and 1994), Medellin (IADB 1994), Buenaventura (Dutch Development Dutch, 1996), Pereira (IADB, 1998), Cartagena (IADB and WB 1998).
NATIONAL GOVERNMENT	300.0	-	-	300.0	Medium and small cities (WB: 1987, 1988, 2001, and 2004)
REGIONAL ENTITIES	90.0	50.0	100.6	240.6	CAR (IADB 1989), Cesar (CAF, 2006), Magdalena (CAF, 2007), La Guajira (WB, 2007)
Institutional strengthening and studies	3.0	3.1	-	6.1	CRA regulatory developments (IADB, 1994), Pereira preinvestment studies (IADB, 1996); PSP Structuring - DNP and Ministry (WB, 1997); Study on Subsidies (IADB, 2003)
TOTAL	795.0	378.3	109.1	1,282.4	

WB: World Bank; IADB: Inter American Development Bank; CAF: Corporación Andina de Fomento.

FINDETER (*La Financiera de Desarrollo Territorial*), a state-owned bank for territorial development, has traditionally channeled credits from the multilateral banks through the financial system towards infrastructure works with long maturity periods. However, there has been a process of credit substitution by the SGP transfers (see Figure 3).

Figure 3. FINDETER Credit and SGP Transfers


Source: FINDETER and DNP

From the above it may be stated that the sector's investment financing approach in Colombia provides several lessons: (i) it is necessary to establish institutional arrangements to efficiently coordinate the scattered funding resources; (ii) in a decentralized system with such a fragmented industry structure as in the case of Colombia, and with a system of transfers from the Central Government to the municipalities, regional service provision schemes can be a useful tool so that the state contributions are not atomized; (iii) when there are substantial annual state allocations specifically earmarked for the sector, it is essential to establish arrangements so that the departmental and municipal global fiscal restrictions do not become an obstacle to access credits secured by those future flows; and (iv) if there is a system of transfers from the Central Government to the municipalities, objective criteria can be established for their regional distribution for improved targeting.

1.2.5. Supply and Demand Subsidies in Colombia

The sector financing approach in Colombia combines demand-side subsidies, which cover a lower cost service for selected users, with supply-side subsidies, understood as those covering part of the investment costs, whether through direct subsidies to the service provider or through the delivery of infrastructure that is not reflected in the tariff.

Demand-side subsidies are included in cross subsidy system among users classified in six strata, according to a methodology which takes into account the

characteristics of the household and the neighborhood. Strata 1, 2, and 3 users receive maximum subsidies of 70, 40 and 15 percent, respectively; those of stratum 4 pay the cost of the service and those in strata 5 and 6, as well as industrial and commercial users, pay a "solidarity contribution" of 20 percent at a minimum over the cost as may be required. Since the cross subsidy scheme often runs a deficit due to the fact that most users fall in the lower strata, demand subsidies are partially financed with the General Revenue-Sharing System (SGP).

Supply-supported subsidies are mainly financed with SGP resources, executed by the municipalities, and with investments made by other agencies at various government levels. In some cases, infrastructure works are contracted by the public agency executing the investment, and in others, by the service provider through agreements with the municipality when it is a state company, or under the specifications of an "constructor-operator" agreement, when such a partnership exists.

Within the Latin American context, cross subsidies and investment subsidies prevail (see Table 5). Targeting schemes based on geographical zoning according exclusively to household and neighborhood characteristics, similar to that in Colombia, can be found in Argentina, Bolivia, Paraguay, Peru, and Panama. In other countries like Brazil or Chile, household socioeconomic information is used. The Chilean case also has the special characteristic of not having a cross subsidy scheme and applying direct subsidies.

Table 5. Subsidy Schemes in Some Latin American Countries

Country/City	Are there cross subsidies?	Are there direct subsidies?	Are investments subsidized?	Targeting scheme
Argentina				
Buenos Aires	Yes	No	Investments (some municipalities)	By zone, quality of housing and year of construction
Cordoba	Yes	No	No	-
Bolivia			Investments (population below 10,000 inhabitants)	By geographic area
(La Paz/El Alto)	Yes	No		
Brazil				
Ceara	Yes	No	Some	By social conditions
Pernambuco	Yes	No	---	By social conditions
Sao Paulo	Yes	No	No	By social conditions and geographic area
Chile	No	Yes	No	By family income
Colombia	Yes	Partial	Yes	By geographic area (based on quality of housing)
Costa Rica	Yes	No	Yes	---
Nicaragua	Yes	No	Yes	---
Panama	Yes	Yes	Yes	By geographic area
Paraguay	Yes	No	Yes	By type of housing
Peru	Yes	No	Yes	By geographic area
Uruguay	Yes	No	---	---

Source: Fernández (2006)

The cross subsidy scheme is a good "solidarity" tool among served users, but it is not necessarily the most efficient one to provide access to households that do not have the service.³¹ In this sense, an investment subsidy is a necessary complement until high levels of coverage are reached. In spite of this, there are two aspects to bear in mind when assessing the Colombia case, but which have

31 Foster et al (2000).

been demonstrated elsewhere: (i) a good financing/subsidy system will often include adequate targeting mechanism, so that the subsidies reach those who really need them; and (ii) a premium should be given to transparency in terms of financing, accounting registration, and use of subsidies.

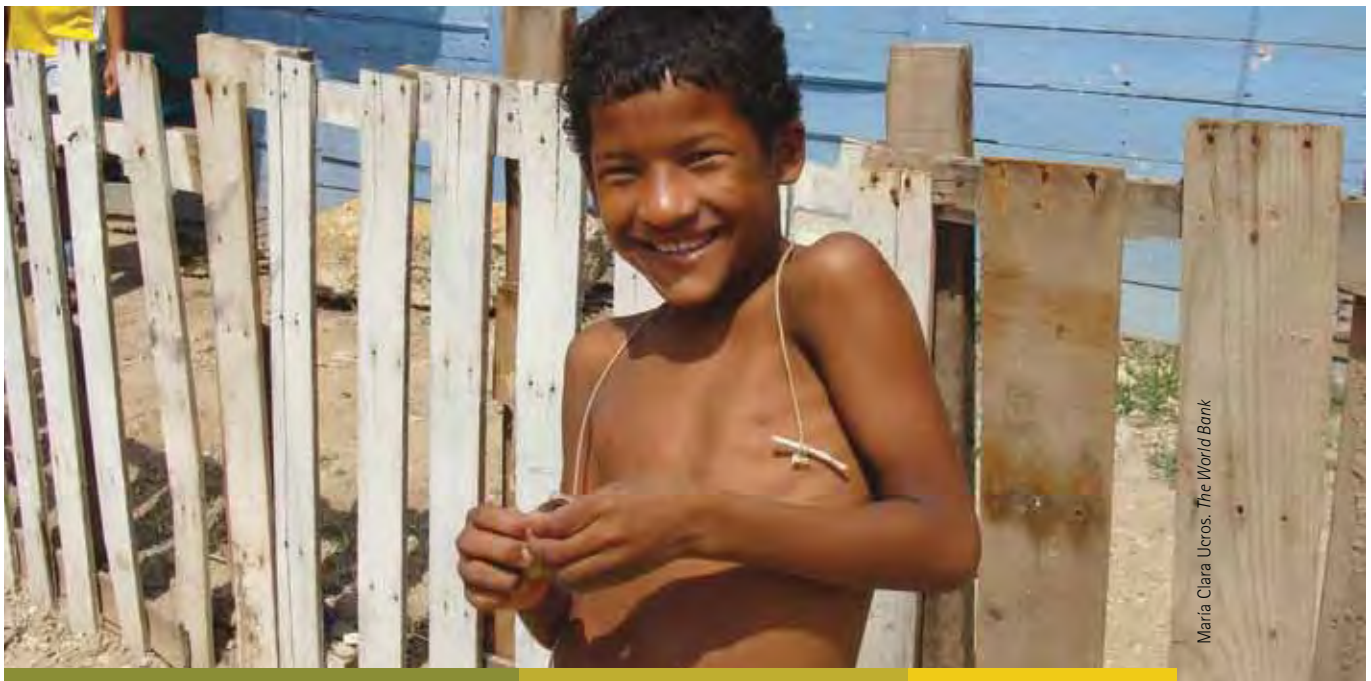
In the case of Colombia, there is evidence of less than optimal targeting.³² This is not only due to flaws in the beneficiary selection tool, but also to the deficient calibration of regulatory parameters such as the percent of subsidy granted (regulated by the National Congress), and to the basic consumption level or maximum consumption that can be subsidized (regulated by the CRA), which has been set at 20 m³ per user per month, above international standards.³³

The targeting schemes based on socioeconomic characteristics, as in Chile, which operates a "self-selection" process, produce a lower error in the inclusion level (households receiving the subsidy that should not receive it due to their income level), but at the cost of a higher exclusion error (households that should receive subsidies but do not). This inverse relationship is seen when comparing the cases of Colombia and Chile.³⁴

32 DNP (2006) and Fedesarrollo (2005).

33 Estimates of monthly subsistence consumption from private connections range from 8 m³ per month (for a family of five to meet basic hygienic requirements) to 16 m³ per month (modest domestic use in urban settings for a family of five.) Kovines (2005).

34 Gómez-Lobo, A. (2000).



1.3. Institutional Organization of the Sector and Participation of the Private Sector

In Colombia, as in other countries, sector development and the resulting structure of provision is determined to a great extent by the political administrative organization of the country. This includes achieving an effective transfer of responsibility of service provision to the municipal level through the intervention of the departments. There are 1,122 municipalities in the country, 841 of which have fewer than 25,000 inhabitants and 203 in the range of 25,000 to 100,000, each of which receive National Government transfers to be used specifically for WSS.³⁵ The result is the scattered structure of the industry as a result of the presence of different operators in municipalities that could, in principle, be agglomerated, just one with benefits in terms of economies of scale.³⁶

Despite the above, the results of the reforms have been favorable for the development of the sector. As can be seen in Table 6, as of 2006, there were 620 Public Service Companies (ESP) registered in the country, 38 percent of which have some degree of private sector participation (PSP). Most of these ESPs with private sector involvement have operated the water and sanitation systems

35 Law 60 of 1993 and Law 715 of 2001.

36 In spite of this, some regional schemes have been developed. In the Valle department there is a model that revolves around a departmental public company, Acuavalle S.A. – ESP, which operates in 35 of the 42 medium sized and small municipalities in the department; Empocaldas S.A. ESP provides services to 21 small and medium sized municipalities out of the 27 in the Department of Caldas.

with a higher efficiency and business management, and in the larger cities and in some municipalities there has been significant progress concerning coverage and quality.

The territorial configuration of PSP has been the result of different dynamics (see Box 4). Although the greater proportion of companies with PSP is found in the larger municipalities (with nearly 60 percent of the companies operating in cities with over 100,000 inhabitants), there is also an important number of them in medium-sized and small municipalities (there are 160 companies with PSP operating in municipalities with less than 100,000 inhabitants).

Close to 650 municipalities, however, still have direct service provision by the municipal administration (an exceptional arrangement) and it is almost always inadequate. Other municipalities, in spite of having established Public Service companies, have poor business management.

Table 6. Providers According to Legal Status and Size of Municipality 2006.

Range of number of inhabitants per municipality	Municipalities in the country	Total providers (1)	Private ESP (2)		Public ESP		Municipality direct provider (3)		Community organization
	No.	No.	No.	%	No.	%	No.	%	No.
Over 500,000	7	26	21	80.8	5	19.2	0	0.0	59
100,000 to 500,000	48	103	55	53.4	43	41.7	5	4.9	190
25,000 to 100,00	203	274	79	28.8	134	48.9	61	22.3	245
Less than 25,000	841	866	81	9.4	202	23.3	583	67.3	788
Total	1,099	1,269	236	18.6	384	30.3	649	51.1	1282

(1) Includes private and public ESPs and provider municipalities, and excludes community organizations.

(2) Of the 236 ESPs with private participation, 197 are private and the rest are mixed (with a public shareholding of at least 50 percent), and 113 are the main operator in the respective municipality.

(3) There is no operator registered for 162 municipalities and it has been assumed that these municipalities provide the service directly.

Source: SSPD - Registro Único de Prestadores (Unified Providers Registry) (December 2006): by place of operation

Some municipal public companies have undertaken restructuring processes, which to a greater or lesser extent have made it possible for them to improve their competitiveness, at least compared with the previous decade. The presence of the PSP option, apart from its direct effect on markets, in a way generated a more credible threat for state companies, prompting restructuring processes

with or without PSP³⁷, within a framework of rules which does not discriminate between state or private companies.³⁸

In addition, some municipalities found a solution for the management of services through a community organization approach. There are 1,282 organizations of this type that are registered, 77 of which are the main provider in a municipality; 23 percent are in urban areas and the rest are rural. In some cases, this type of service provider can be efficient in its operations as well as in terms of market structure, because of their location in areas far from the urban centers. Other cases, although they might be successful operatively and in the view of the community, by presenting relatively low costs – even being located within or close to urban centers – could be generating a suboptimal industrial structure. Moreover, though there are no documented cases, it is believed that these organizations provide very poor quality levels of service to users who could be served by the main operator in the area under better conditions.

Another dimension of the PSP experience in Colombia and its relationship with the structure of the industry can be seen in the identification of "business groups", understood as the presence of a majority or important shareholder in at least two municipalities, which accounts for a business structure that seeks to expand its presence in the markets. Seven foreign and fifteen domestic groups have been identified.³⁹ In addition, another 33 private Colombian companies provide services as the main operator in just one municipality and 99 are in relatively small areas of specific municipalities (Table 7).

The seven foreign groups operate in 23 municipalities and serve more than 12 percent of the urban population of the country, while the domestic companies are the main providers in 111 municipalities and cover 20 percent of the population, for a total participation of the private sector of 32 percent of the country's urban population.⁴⁰

37 For example, the EAAB carried out a restructuring process that made it possible to overcome the serious financial situation it was going through in 1993; EPM of Medellín is considered a stable company which has the advantage of also operating the energy and telecommunications services; and some companies, like Aguas, Aguas de Pereira, and Aguas de Manizales, which became mixed ESP with a small private participation, have improved their performance.

38 An exception was that the tax regulations maintained a partial income tax exemption for state companies only, until 2002, which generated some distortion in connection with the regulated capital cost.

39 Rozo, J. (2007).

40 The participation of community organizations is not included.

Table 7. National and Foreign Private Business Groups: Participation in the Urban Market and Distribution by Size of Municipality

Origin	Number of groups	Number or municipalities	% of urban population	Number of municipalities according to range of inhabitants				
				> 500,000	100,000 to 500,000	50,000 to 100,000	25,000 to 50,000	< 25,000
Foreign groups	7	23	12.4	2	6	3	3	9
Colombian groups (in 2 or more municipalities)	15	78	11.2	2	9	17	16	34
Colombian companies (main in 1 municipality)	33	33	8.9	1	11	2	4	15
Subtotal (main providers)	55	134	32.5	5	26	22	23	58
Colombian companies in municipality areas	99	99	n.a.	16	28	24	9	22
Total of private companies	155	233	n.a.	21	54	46	32	80

Source: DNP – Subdirectorate for Water Services and Sanitation (Subdirección de Agua Potable y Saneamiento Básico)

Box 5. PSP Territorial and Business Configuration

Although the first private operators went to large and medium sized cities, PSP has been progressively expanding to smaller municipalities since the second half of the 1990s. A significant percentage (72 percent) of the municipalities where private operators have initiated operations since 1991 are concentrated in the Atlantic Region and the Antioquia Department. The highest concentration of PSP is in the Atlantic region, where 48 municipalities (25 percent of the region's total) have private operators, 28 of which participated in the framework of the MAVDT's Business Modernization Plan.

One important aspect is the fact that in some cases these operators are small and medium enterprises with technological and managerial capacity adapted to the characteristics of small municipalities, contrary to the general belief that private participation

would only be able to operate or be profitable in the country's large cities. These companies, on the contrary, operate in one or several municipalities and some concentrate their activity in specific regions.

There is an interesting case of a large operator established in an important urban center, which has expanded its operations to nearby smaller municipalities making use of economies of scale. Triple A of the Spanish group INASSA (Canal de Isabel II), provides services in Barranquilla, a city with 1.1 million inhabitants, Soledad, Puerto Colombia, and Galapa, and as majority shareholder of the new company AAA Atlántico S.A ESP, operates the "coastal water system", which covers the municipalities of Usiacuri, Juan de Acosta, Piojo, Tubara, within the framework of an agreement with a state company (ARCOS ESP), made up of four municipalities. Triple A ESP has thus increased its market from 205,000 subscribers to approximately 296,500.

Foreign and domestic private business groups: Departmental and municipal distribution and concentration

Business Group	Departments (municipalities between parenthesis)	Number of municipalities
Domestic groups	15	78
Aas Sa	Antioquia (12)	12
Hydros	La Guajira (9), Cundinamarca (2), Tolima (1)	12
Conhydra	Antioquia (8), Valle (1)	9
Aguasol	Antioquia (4), Atlántico (2), Magdalena (1)	7
Aguas de La Guajira	La Guajira (1), Atlántico (1), Magdalena (1), Quindio (1), Sucre (1)	5
Grupo Sala	Bolívar (3), Sucre (2)	5
Ingeniería Total	Antioquia (5)	5
Acuagyr	Cundinamarca (4)	4
Operadores de Sevicios	Antioquia (4)	4
Uniaguas	Córdoba (4)	4
Presea	Magdalena (2), Antioquia (1)	3
Francisco Velásquez	Chocó (2)	2
Sie	Cauca (1), Nariño (1)	2
Sistemas Públicos	Antioquia (2)	2
Salas	Santander (1), Vichada (1)	2

Foreign groups	7	23
Inassa (Canal de Isabel II)	Atlántico (13: Barranquilla & neighbors), Magdalena (Santa Marta)	14
Proactiva	Córdoba (1), Boyacá (1), San Andrés (1)	3
Grupo Colombo-Cubano	Cundinamarca (2: Agua de Dios & Tocaima)	2
Aguas de Barcelona	Bolívar (Cartagena)	1
Bermad	Valle (Tuluá)	1
Grupo Colombo-Venezolano	Cauca (Caloto)	1
Suez Lyonnaise Des Eaux	Valle (Palmira)	1

Source: Taken from Rozo (2007).

1.3.1. Evolution of Private Sector Participation in Colombia's Water Services and Sanitation Sector

In the years prior to the structural reforms of the 1990s, the sector's institutional crisis worsened, with state-owned companies with high labor and financial liabilities, poor quality and continuity of service, poor infrastructure conditions, investment deficits, inadequate tariff policies, and poor commercial management.⁴¹

The crisis was conducive to local political consensus in some cities which made it possible to initiate the first attempts at restructuring. The National Planning Department supported the structuring of the first PSP processes in four departmental capitals (Montería, Barranquilla, Santa Marta, and Florencia), with the writing off of liabilities and the creation of mixed-capital companies, succeeding in incorporating nearly 50 percent of the shareholding by investors in each city. This became the "first PSP generation" and took place between 1991 and 1994.

⁴¹ The crisis was evident in the serious financial situation of important state companies such as those of Bogotá and Barranquilla, and over the following decade – and in spite of the regulatory and policy tools developed by the National Government – in the SSPD taking over the state companies of Cali, Cucuta, San Andrés, and Quibdo, among others, or in the poor services that some municipalities continue to provide directly.

After this first experience, the need for a more elaborate institutional framework for the development of the PSP processes became evident. This "second generation PSP" policy package was implemented in two stages. The first was defined by a new regulatory framework which offered clearer conditions for private participation (Law 142 of 1994 and tariff regulation issued by the CRA in 1995). The second stage was defined by the formulation of an explicit public policy for the promotion of PSP⁴², which materialized with the creation of the Corporate Modernization Program of the MAVDT⁴³ in 1998, and the incorporation of the first private operators within the framework of that program, starting in 2000.

Law 142 of 1994, as well as the issuing of the first tariff methodologies by the CRA in 1995,⁴⁴ considerably stimulated private sector participation. This can be seen in the appearance of operators with PSP in 37 municipalities between 1996 and 1998 through processes originating at the local level and some with the support of the National Government (Figure 4). It was at this stage that the first foreign operators came to the country.⁴⁵

The "third generation of PSP" has emerged since 2000, when the first private operators came as a result of the processes included in a structured support program by the National Government for PSP. The structuring supported by the Corporate Modernization Program (PME) of the MADVT covers 34 of the 59 municipalities (58 percent) where PSP emerged between 2000 and 2006.

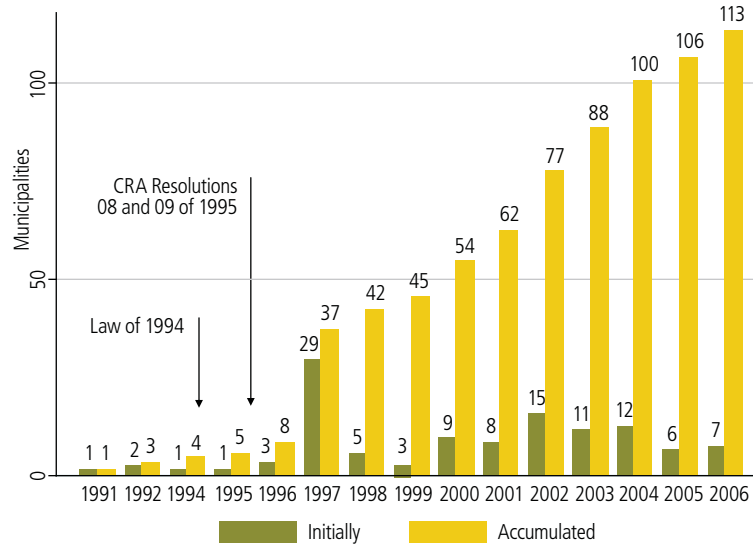
42 DNP (1997).

43 Environment, Housing and Territorial Development Ministry starting in 2003, previously the Drinking Water Board was in the Development Ministry, which disappeared with the administrative reform of that year.

44 CRA Resolutions 08 and 09 of 1995.

45 The Spanish groups INASSA (Canal De Isabel II of Madrid) in Barranquilla and Aguas de Barcelona in Cartagena, and the French group Suez Lyonnaise Des Eaux in Palmira.

Figure 4. Evolution of Number of Municipalities with PSP Operator (Year of Start of Operations)

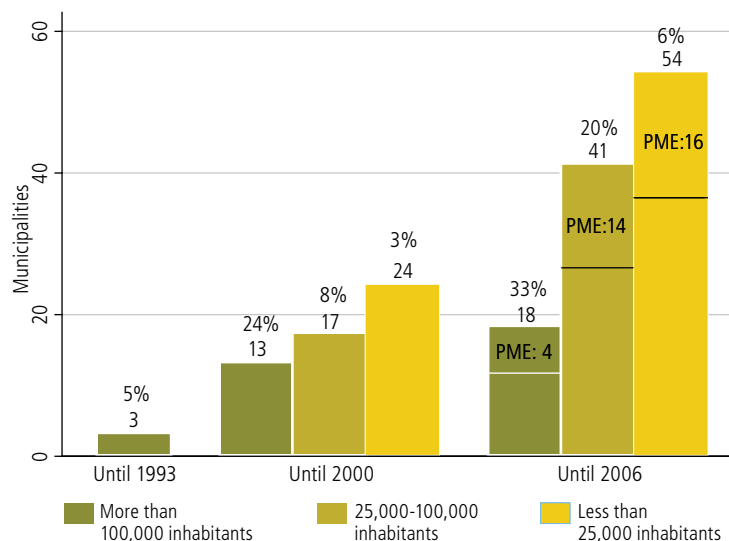


Source: DNP – Under-Directorate of AP and SB, based on SSPD – SUI and direct consultation

Note: The information refers to municipalities where the company with PSP is the "main operator" according to the number of subscribers. Seventy seven municipalities are excluded where the main operator is a community organization

The PME deliberately focused on the Atlantic region, in large part because it is one of the areas where coverage and quality are most lacking, where the institutional weakness is more pronounced, and where the sector resources are limited. An interesting characteristic of this stage is the consolidation of the PSP expansion to medium municipalities and, especially, to small ones (less than 25,000 inhabitants), following the concentration in the first and second generations on cities with more than 100,000 inhabitants (Figure 5). Through the PME, the National Government has played an important role in financing PSP structuring processes and investment in infrastructure in municipalities of smaller size and more precarious socioeconomic conditions.

Figure 5. PSP by Municipality Size and Stages of Entry and Corporate Modernization Program (PME) between 2000 and 2006



Source: DNP – Under-Directorate of AP and SB, based on SSPD – SUI and direct consultation

1.3.2. Mechanisms for Partnership with the Private Sector

Colombia has supported the coexistence of different institutional arrangements of public-private actors for service provision. This is partly due to the broadness of the framework established in Law 142 of 1994 for PSP under the principle of free entry to the market, as well as the institutional quality and the local competition surrounding the provision of services, leading to different market and competition dynamics.

This diversity of schemes is part of what makes Colombia a special case. In many countries, PSP arrived exclusively through concession agreements in certain cities, under rules and, in some cases, under a regulatory institutional framework exclusive to the agreement.⁴⁶

The economic nature of water and sanitation services places it close to a natural monopoly and, therefore, competition in the market is not common, though it may be found in some special cases. Although this lack of competition does not result in a large market share for companies, they can be located in strategic expansion areas, either because of the type of users

⁴⁶ The modality that has not emerged in Colombia is pure privatization (with transfer of ownership of the assets), although this is not common in other countries either.

– who can be relatively profitable – or because, in the medium term, an area may become a market of considerable proportions.⁴⁷ This scenario is a reality in Bogotá and in other cities in the country.⁴⁸ There are at least 47 municipalities where the main provider is public and there is at minimum one private company and, in some cases, community organizations providing the services in urban areas.⁴⁹

It is clear that regulation is required to preserve efficiency and fairness. It provides guidelines to prevent conflicts or to solve them in case of potential abuses of a dominant position, unfair competition or damages generated by any of the parties. In the case of the city of Bogotá, conflict arose between Empresa de Acueducto de Bogotá (EAAB), a state company, and Coopjardín Ltda., which serves a small share of the market in the northern area of the city and which competes with the former for the expansion market in the area. EAAB set limits to the amount of water sold in block to Coopjardín and denied it access to two interconnection points, thus limiting its expansion capacity. The CRA solved the case by applying the corresponding rights of way.

Competition in the market requires the existence of some behavior regulating mechanism so that companies are committed to efficient and results oriented management. In Colombia, the tariff and Management and Results Plan regulations issued by the CRA fulfill that function.

In addition, competition for the market through contracts is defined by the ownership of assets, which belong to the municipalities, to be managed by private companies. This market power translates into a decision-making power through the way in which the municipalities meet their legal responsibility of ensuring an efficient service provision.

There have been several types of arrangements to establish a PSP partnership in Colombia: (i) operation agreements, which can differ in mechanisms for remuneration, but which have in common the fact that the responsibility of financing investment is not assigned to the operator; (ii) the special case of operation agreements for a private company to manage and operate specific activities in the process of service provision, having as a special characteristic that the

47 Market competition can also appear in some regions where there is a market dynamic of "block water sales" to companies distributing the water in their respective municipalities and where there are alternatives for supply.

48 Section 11 of Law 142 defines the obligation of allowing other companies or large consumers to access water networks to allow for transactions with the company that owns those networks.

49 These dynamics are more probable in markets where there is no historically established agreement between the municipality and the state-owned company.

contracting party is a state-owned company and not the municipality, since the state-owned company is for all purposes responsible for the integral provision of services⁵⁰; (iii) concession agreements with different designs, but characterized by the fact that the operator has the responsibility of managing and financing investments and of taking on the operating and commercial risks, derived from financing and from the process of investment in infrastructure; and (iv) partnership schemes.

There are 14 concession agreements that cover 22 municipalities, 27 operation agreements covering 37 municipalities, and 31 partnership arrangements which are all individual. These can also involve some kind of agreement between the municipality and the company that is set up, even if the municipality, in itself, is a partner of the company. In Barranquilla, for example, the private company has the municipality as a partner and there is a concession agreement between the company and the municipality; in Santa Marta the agreement is for the concession of the infrastructure and in Palmira there is a concession agreement between ESP Acuaviva and the company in which the municipality is a shareholder and Empalmira, the state company which previously provided the service.

Box 6. The Case of Bogotá

Beginning in 2003, Empresa de Acueducto y Alcantarillado de Bogotá (EAAB) adopted an outsourcing process of its activities of operation and management of systems by area. Within this scheme EAAB has retained the ownership of the assets and the definition of the investment plans to be carried out, outsourcing the system management to specialized operators (SO).

In this way, the SOs are subject to obligations regarding operation and maintenance of the systems. For this purpose, the systems were divided into hydraulic sectors. These agreements –unlike the typical management agreement where there is no relationship between manager and user – have explicit obligations in commercial matters (customer service, responding to petitions, claims, and complaints) although there is no direct contact between the manager and the customers through bill collection. That is to say, for the user EAAB is still the responsible party, even if it is the managers who directly address the users' petitions.

50 This modality results from a restructuring process of a state company which seeks better efficiency levels through subcontracting processes to provide the services, as could be the operation of sectors in the system, but it is not the same as *outsourcing* an isolated activity. The case of Bogotá has been identified within this modality (see Box 5).

The SO remuneration has been programmed based on the targets defined in their proposal. The managers' special obligations are based on meeting indicators of Customer Service, Updating, and Maintaining User Records, Index of Unaccounted for Water, and Consumption Metering. In connection with commercial aspects, the managers have to meet customer service targets, add new users to the company's database, and manage the portfolio in their area. In terms of operations, the manager has obligations in areas related to loss control and damage repair.

The company pays a rate to the contractor per cubic meter invoiced and paid through billing. It also pays for the value of the new water and sanitation works. The manager gets 4 percent of the portfolio effectively recovered and 8 percent of the value of the works in its area for the concept of intervention. For the management of developers and constructors, the manager receives 2 percent for reviewing and approving the designs and 6 percent for inspection and acceptance of works. The market is divided into 5 areas, based on the hydraulic segmentation of the network.

The mixed scheme adopted in Bogotá has shown some positive results, in addition to the high levels of coverage and service quality. Before the arrival of the SOs an application for connection took 56 days, while the average recorded for 2006 was 9.2 days. In addition, it took 22 working days on average for a claim to be answered and with the SOs this was reduced to 2 days in 2006. The outcomes in terms of positive image of EAAB have improved significantly since the arrival of the SOs. In 2000 48 percent of the market in Bogotá had a positive impression of the company; by 2003 this indicator had gone up to 68 percent, and in 2006 it was 75 percent. Since 2002, there have been 60,000 new users added per year, 47 percent more than before the SOs.



1.4. The MAVDT's Corporate Modernization Program (PME)

Faced with the need to evolve towards a more standardized model of PSP in connection with the so called "first generation" processes, DNP and the Ministry of Economic Development agreed that it was necessary to formulate a national PSP policy for the sector and to structure competitive and free competition processes, with objective selection criteria, for effective competition at the time of market access. Furthermore, it was decided that it was necessary to make significant state contributions to co-finance investments and improve the targeting of public resources.

The Conpes (*Consejo Nacional de Política Económica y Social*, or National Economic and Social Policy Council) document 2912 of March 1997 defined the strategies for PSP in WSS, among which the following stand out: (i) setting up the Private Participation Technical Committee for WSS with the Ministry of Economic Development, FINDETER, and the DNP to promote partnerships with the private sector; (ii) generating a program for private participation in WSS in the Ministry of Economic Development under the guidelines of the Technical Committee to carry out well structured demonstrative processes; (iii) managing credit and cooperation with the multilateral banks to finance the program, and authorizing FINDETER to allocate part of the INSFOPAL debt collection to financing the program; (iv) carrying out a study, under the coordination of the Ministry of Economy and Public Credit, to define the methodology for the identification and allocation of risks, and for the valuation, financing, accounting, and liquidity of

guarantees; and (v) reviewing the criteria for the allocation of co-financing resources to stimulate institutional modernization in the WSS sector.

In this context, in 1997 the "Private Participation Area" was set up in the DNP and the Ministry of Finance and Public Credit (*Ministerio de Hacienda y Crédito Público*, MHCP), the financing of which came from cooperation and credit resources of the Inter-American Development Bank (IDB). In February 1998, the Corporate Modernization Program was incorporated into the Municipal Development Project with the World Bank. Its goal was to provide technical assistance to decentralized entities (municipalities and departments) for partnerships with the private sector. The program resources would be used to pay for consultation on the structuring of pilot cases and to carry out studies that would be useful in the definition of new credit operations with the World Bank, including funds for infrastructure investment. Also, over the following months the water supply component was shifted from the "Private Participation Area" of the DNP to the Economic Development Ministry.

1.4.1. Financing and Functioning of the PME

The Government signed a loan with the World Bank in 2001 for US\$40 million.⁵¹ This loan took into account previous experiences of PSP process structuring (see Box 6). These resources were used to finance infrastructure works for some of the processes that had been structured in the past and in new PSP processes, as well as for the respective consultant studies for the technical, legal, financial, and environmental structuring, and the PME implementation unit in the Ministry of Economic Development, whose functions in the sector would later shift to the MAVDT.

The program activities were directed to the Caribbean Region. The new operation defined two types of schemes to partner with specialized operators:

- **Operation with Investment Agreement:** a modality with a strong emphasis on the concession scheme, for municipalities where the payment capacity of the population made it possible to finance a significant portion of the investment through tariffs and the support of public resources would be supplementary. The operator would be in charge of the design and execution of works.
- **Constructor Operator Agreement:** a modality with a greater emphasis on management, devised for smaller municipalities where most of the investments are done with public resources, given the low payment capacity of

⁵¹ The national counterpart was US\$30 million, for a total budget of US\$70 million.

the population. In this model, key system investments are planned for the first two or three years and are designed from the outset, so the operator is in charge of their construction. This has two main advantages: (i) it makes it possible to show the population a short term service improvement, generating trust, and legitimizing the process; and (ii) through the inclusion of the construction business, the cash flow of the first operating year is improved, which helps mitigate risk.

Box 7. Lessons from the PSP Processes Prior to 2000⁵²

- **Flexibility to add or eliminate municipalities.** This is necessary since the political commitment of mayors, which is essential for the success of the program, may change during the implementation.
- **Assigning adequate terms to readjust the proposals.** Due to the risks of incomplete and unverifiable information, the bidding design has to be flexible and there has to be an adequate time to reformulate the proposals in order to provide convenient incentives to attract bidders.
- **Contracting a single consultant to structure a PSP process.** It is preferable to manage just one consulting agreement to prepare a PSP process, including responsibility for all activities, rather than dividing activities into two contracts involving the preparation of the investment program and the preparation of financial projections, legal aspects, and bidding documents. Additionally, due to the complexity of the processes, the consulting firms are not able to prepare more than two or three processes simultaneously for the medium sized cities.
- **Low capacity of small municipalities to contribute to investments.** The municipalities' contribution to investments is low and in the best of cases it might reach 20 percent. Therefore, the Government must continue playing an essential role in the sector by providing funding to small municipalities.
- **Provide ongoing support to new processes.** Signing a PSP agreement is just the beginning of a complex process that requires several years to consolidate. The Government must permanently support the new processes in technical, financial and political terms.

52 World Bank (2000), Project Appraisal Document - Credit 7077-CO.

The PME approach relies upon each municipality's demand. Thus, the municipalities need to express their interest to be part of the PME through the signing of an agreement for technical assistance with the Ministry, having previously submitted an agreement with the Municipal Council where the following has been approved: (i) the commitment of future flows of funds transferred by the Nation for specific use in WSS (Law 715 of 2001), to be used within the framework of the project; and (ii) the mayor's powers to implement the process of partnership with a specialized operator, including the usufruct of the infrastructure, the credit agreements, and the liquidation of the existing company to create a new one.

The structuring of the PSP start-up process is divided into three stages: (i) gathering information on the company, service, and municipality; (ii) financial modeling of the business and development of the terms of agreement and bidding documents; and (iii) supporting the bidding process until the signing of the agreement with the specialized operator. Finally, a financial support agreement is signed confirming the Nation's contribution of resources to the project.

The structuring process seeks to formulate and put into practice a scheme that is attractive to investors. This is a complex exercise for several reasons. First, the provision of services at the municipal level that arrives at the PME is often in critical condition due to poor coverage, low quality and financial problems of the existing companies with numerous labor and financial liabilities. Second, the municipalities are often in a bad fiscal situation. Third, dissatisfaction and distrust often prevails in the population with regards to its leaders and the providing company. Fourth, the infrastructure has often deteriorated and large investments are needed to enable the service. Additionally, tariff collection levels are almost always very low or nonexistent. In many municipalities, reaching political consensus among municipal council members is difficult. Finally, there is often strong political opposition to any signs of a tariff increase.

1.4.2. Results of the PME

Between 1998 and 2008 the PME has taken part in the structuring of 30 processes to establish arrangements with specialized operators, involving 49 municipalities and benefiting approximately 2.5 million inhabitants. The processes have been structured in municipalities with a much lower coverage than that of the average in the country. The progress to date has been overwhelming in most cases (Table 8). In more advanced processes like Maicao, Soledad, and Montería, progress has been quite significant, but also in more recent projects, like ERAS

(Córdoba) and Turbaco and Arjona, significant improvements can be seen in the continuity of services even where there has been no construction of major works in service infrastructure.

In reviewing the PME experience, we find that not all cases have been successful. Some of the processes that were structured used up resources and did not end in the contracting of a specialized operator. These "failures" can be classified as "total failures" and "partial failures". Within the first category, there are processes with partial or complete structuring that covered at least 40 municipalities and in which the bidding process was not opened. In most cases the failure resulted from the difficulty in reaching political consensus by local officials.⁵³

The "partial failures" correspond to processes that did not achieve the involvement of an operator in the first attempt but that later were carried out, as in the cases of Soledad, Buenaventura and San Andrés⁵⁴, and regional ERAS (Córdoba), Sincelejo and Corozal (Sucre), Arjona and Turbaco (ARAT in Bolívar), Baranoa and Polonuevo (Atlántico). The cases of ERAS and ARAT went through bidding processes three and four times respectively, until they were successfully awarded in 2003 and 2004.

53 These include Neiva, Ibagué, Popayán, Malambo, Sabanagrande, Magangué, Quibdo, Armenia, Barrancabermeja, Desquebradas, Bucaramanga, Tumaco, Piojó, Manatí, Usiacurí, Juan de Acosta, Tubará, Repelón, Duitama, Cúcuta, Carmen de Bolívar, Magangué, Santa Lucía and Palmar de Varela, and regional Acuavalle, Lórica (Erca), North of Córdoba, Atlántico Oriente, Regional of Nariño, Regional Centro Cesar. Completed structurings which never opened to bidding are found in Chía, Cajicá, Tabío, Tenjo, Sopo, Tocancipa, Gachancipa, Mahates, Villeta, Sasaima, and La Vega.

54 In San Andrés the process was led by the SSPD within the framework of a take-over process, while the PME supplied technical assistance.

Table 8. Processes Structured with PME Support

Project	Department	Municipalities	Scheme	Operator	No. Of Municip.	Starting date	Initial Water S.	Initial Sanitation	Coverage			
									Current Water S. 2006	Current Sanitation 2006	Target Water S.	Target Sanitation
1	Cordoba	Monteria	20-year concession	Proactiva S.A. E.S.P.	1	Jan-00	60,0%	25,0%	93,0%	93,0%	90,0%	80,0%
2	La Guajira	Riohacha	20-year Operation	Aguas de la Guajira S.A. E.S.P.	1	Nov-00	80,0%	41,0%	95,0%	80,2%	90,0%	85,0%
3	Huila	Nataga	Construction - 10-year Operation	Empresa de Acueducto y Alcantarillado de Nataga A.A.S.S. - S.A. E.S.P.	1	Mar-01	76,0%	90,0%	99,0%	95,0%	100,0%	98,0%
4	La Guajira	Maicao	30-year concession	Aguas de la Peninsula S.A. E.S.P.	1	Apr-01	38,0%	23,0%	76,0%	53,0%	98,0%	95,0%
5	Meta	Cumara	Construction - 10-year Operation	Empresa Aguas del Llano S.A. E.S.P.	1	Aug-01	93,0%	nd	97,0%	95,0%	100,0%	
6	Chocó	Tadó	12-year Operation & Management with Construction Plan execution	Francisco Velásquez Ingeniería Civil y Sanitaria S.A.	1	Oct-01	46,0%	50,0%			95,0%	85,0%
7	Chocó	Itsmia	12-year Operation & Management with Construction Plan execution	Francisco Velásquez Ingeniería Civil y Sanitaria S.A.	1	Oct-01	33,0%	17,0%			95,0%	85,0%
8	Bolivar	San Juan Nepomuceno	10-year Operation	Consorcio Estudios Técnicos S.A. - ANDECON Ltda., (Aguas de la Costa S.A. E.S.P.)	1	Dec-01	76,0%	13,0%	80,0%	13,0%	100,0%	43,0%
9	Atlántico	Soledad	Operation with 20-year Investment	Sociedad de Acueducto, Alcantarillado y Aseo de Barranquilla S.A. E.S.P.	1	Jan-02	47,0%	36,0%	80,0%	69,0%	94,0%	90,0%
10	Cauca	Guapi	20-year Operation	SIF de Colombia S.A. E.S.P.	1	Jan-02	75,0%	65,0%			100,0%	100,0%

Project	Department	Municipalities	Scheme	Operator	No. Of Municip.	Starting date	Initial Water S.	Initial Sanitation	Coverage			
									Current Water S. 2006	Current Sanitation 2006	Target Water S.	Target Sanitation
11	Vichada	Puerto Carreño	Operation with 20-year Investment	Empresa de Servicios de Puerto Carreño - Seppca - S.A. E.S.P.	1	Jan-02	80,0%	10,0%	100,0%	10,0%	100,0%	50,0%
12	Nariño	El Charco	12-year Operation & Management with Construction Plan execution	SIF de Colombia S.A. E.S.P.	1	Jan-02	75,0%	75,0%			100,0%	100,0%
13	Valle	Buenaventura	Management & 20-year Operation	Consorcio Hidroestudios - Conhydra - Hidropacífico	1	Jan-02	90,0%	70,0%			98,0%	90,0%
14	La Guajira	Barrancas, Distracción, El Molino, Villanueva	Operation - 12-year Management	Aguas del Sur de la Guajira S.A. E.S.P.	4	Jun-02	70,0%	67,0%			75,0%	75,0%
15	Sucre	San Marcos	Operation with 15-year Investment	Aguas de la Mojana S.A. E.S.P.	1	Sep-02	60,0%	30,0%	90,0%	0,0%	90,0%	75,0%
16	Atlántico	Sabanagrande, Santo Tomás	Operation with 20-year Investment	ASOSASA E.S.P., terminated the contract. The new operator is Triple A.	2	Nov-02			74,8%	64,3%	95,0%	75,0%
17	Sucre	Sincelejo, Corozal	Operation with 20-year Investment	Aguas de la Sabana S.A. E.S.P.	2	Jan-03	80,0%	77,0%	82,3%	80,8%	98,0%	90,0%
18	Atlántico	Ponedera	Design, construction & 10-year operation	Aguas de la Rivera S.A. E.S.P.	1	Mar-03	78,0%	60,0%	88,0%	60,0%	95,0%	70,0%
19	Magdalena	El Banco	Operation with 16-year Investment	Operagua El Banco S.A. E.S.P.	1	Jun-03	43,0%	28,0%	65,0%	28,0%	90,0%	75,0%
20	Cundinamarca	Agua de Dios, Tocaima	Operation with 20-year Investment	Aguas del Alto Magdalena S.A. E.S.P.	2	Nov-03	93,0%	84,0%	99,0%	80,0%	98,0%	95,0%
21	Atlántico	Baranoa, polonuevo	Operation with 20-year Investment	Aguas del Norte S.A. E.S.P. Contract transferred to Triple A Atlántico on June 2005	2	Dec-03	72,0%	0,0%			95,0%	50,0%

1. Institutional Reforms in the Water Supply and Sanitation Sector in Colombia

Project	Department	Municipalities	Scheme	Operator	No. Of Municip.	Starting date	Initial Water S.	Initial Sanitation	Coverage			
									Current Water S. 2006	Current Sanitation 2006	Target Water S.	Target Sanitation
22	Cordoba	Cerete, Cienaga de Oro, Sahagún, San Carlos	Operation with 20-year Investment	UNIAGUAS S.A. E.S.P.: Created by the UNION TEMPORAL ERAS	4	Jul-04	70,0%	45,0%	86,2%	73,3%	100,0%	100,0%
23	Bolivar	Arjona, Turbaco	Operation with 20-year Investment	ACUALCO S.A. E.S.P.	2	Oct-04			54,0%	9,5%	90,0%	90,0%
24	Cauca	Guapi	20-year Operation	New operator	1	Jun-05					100,0%	100,0%
25	San Andrés	San Andrés	Design, construction & 15-year operation	Proactiva aguas del archipiélago S.A. E.S.P.	1	Oct-05			27,0%	7,0%	65,0%	54,0%
26	La Guajira	Fonseca, Hatonuevo, San Juan del Cesar	NA	Aguas del Sur de la Guajira S.A. E.S.P.	3	Dec-05						
27	Sucre	San Onofre	Construction - 15-year Operation	Tecniaguas S.A. Esp	1	Aug-06	78,7%	27,9%	78,7%	27,9%	90,0%	40,0%
28	Antioquia	Apartadó, Carepa, Chigorodó, Mutata, Turbo	Operation agreement	The regional company Aguas de Urabá S.A. E.S.P. is temporary and will look for an specialized operator.	5	2006						
29	Atlántico	Juan de Acosta, Piojó, Tubara, Usiacurí	Operation agreement	Sociedad de Acueducto, Alcantarillado y Aseo de Barranquilla S.A. E.S.P.	4	2006						
30	Bolivar	Carmen de Bolivar	Operation agreement	Aguas de la Costa S.A. E.S.P.	1	2006						

Source: PME Archives

Note: Itsmina, Tadó, Condoto, and El Charco were part of the Minor Municipalities Group and Rural Areas of the MAVDT, in a pilot case for very small municipalities.

1.4.3. Lessons Learned from the PME

Some of the lessons learned with the development and implementation of the PME include the following:

- (i) **Scheduling of the resources contributed by the Nation:** Most initial scheduling did not contemplate the time needed for processing the National Government contributions, and as a result the operators received resources much later than expected;
- (ii) **Write off of liabilities:** In some processes⁵⁵ the labor liabilities of the old companies, prior to the arrival of the operators, were not covered and the responsibility was delegated to the municipalities. This generated the risk of labor substitution for workers' legal claims against the municipality. In the case of San Juan Nepomuceno, the start date was delayed for almost two years because the electric power company did not provide service until the municipality paid the old arrears.
- (iii) **Concession terms:** In most processes, short periods were assigned for the bidders to prepare their proposals, considering that these agreements have a duration of ten or more years. Periods of less than two months for the preparation of proposals were identified in at least nine processes. (Table 9). This tendency is sure to provoke more uncertainty in the processes, as it forces the bidders to use high safety factors in their estimates, and discourages the participation of investors who are more risk averse or who have business models that demand a good knowledge of the infrastructure situation.
- (iv) **Beneficial use of the infrastructure:** In most municipalities the infrastructure is not properly valued and recorded in inventory. There were cases in which bids were opened without considering that not all the infrastructure belonged to the municipality. In one of the failed concession processes of ERAS (Córdoba), there was no authorization from the Governor and this was one of the reasons given by the operators for not bidding.

55 Sincelejo, San Juan Nepomuceno, El Banco, Sabanagrande, and SantoTomás.

Table 9. Participation of Selected Bidders in Competitions for the PME Market

Process	Opening	Closing	Proposal presentation term (months)	# Bidding documents sold	# Bidders
Turbaco and Arjona	10/22/2003	01/16/2004	2.90	2	1
Baranoa and Plonuevo	08/25/2003	09/29/2003	1.20	3	1
ERAS	11/14/2003	01/03/2004	2.60	5	1
Buenaventura	08/15/2001	11/06/2001	2.80	1	1
Sincelejo and Corozal	08/06/2002	09/06/2002	1.07	1	1
El Banco	12/31/2002	02/14/2003	1.53	2	2
Maicao	11/15/2000	12/13/2000	0.97	1	1
Montería	07/07/1999	10/01/1999	2.90	3	3
Ponedera	12/10/2001	02/15/2002	2.27	4	4
Sabanagrande and Santo Tomás	01/28/2002	03/15/2002	1.57	2	2
San Juan Nepomuceno	01/20/2001	07/05/2001	5.57	1	1
San Marcos	03/14/2002	05/14/2002	2.07	4	4
Soledad	04/14/2000	06/02/2000	1.67	8	8
Turbaco and Arjona	10/22/2003	01/16/2004	2.90	2	1

Source: Rozo (2007).

- (v) Uncertainty of investment plans at pre-feasibility level:** Most processes applying to the PME have a significant investment lag and lack precise information on the state of the systems and on the necessary master plans. Given the urgency of presenting a solution and the limited time during which the Municipal Council has granted powers to the mayor in the matter, the agreements were structured based on conceptual investment plans and not on more structured plans which would demand more time for preparation. It is necessary to design agreements that are better suited to this restriction, in such a way that the allocation of risks is adequate to attract more operators.
- (vi) Definition of scope and quality of the works supervision by independent construction supervisors:** The monitoring role should be based on meeting the established commitments but, in most cases, the contract did not include a definition of the monitoring tasks, nor of the indicators to be monitored. This was in addition to the appointment by the municipalities of people or firms that did not have the correct profile, and they have evidenced more interest in intervening in the operator's administrative decisions than in the achievement of the targets set in the agreements.

- (vii) Agility of shock plan:** The initial PME model implied that the selected operator would only have a conceptual investment plan and had to begin the studies at the design level once the operation started. After that, it had to submit the project for approval and begin the necessary proceedings to sign the financial support agreement with the Nation, to later implement the bidding process for the concession of the works and their execution. This cycle may take up to a year, with a negative effect on the community's perception of the process, lacking rapid improvements in the quality of service. Recent processes have included schemes allowing for the essential works to begin immediately following the arrival of the operator.
- (viii) Awards at the end of the mayor's term:** Often concession processes that were awarded during any mayor's term in office were subject to the opposition of other party candidates during the following mayoral election campaigns. A newly elected opposition mayor often put obstacles in the way of an adequate development of the service operation by delaying the contributions that were his responsibility and using the service as a political tool. The lesson learned is that the process to establish an arrangement with a new operator must involve not only the municipal administration but also the community in general and the other political groups in the region.
- (ix) Institutional aspects:** The processes of corporate modernization require strong political leadership due to the local consensus that is required, as well as a stable and highly specialized support team. These two factors were affected by the PME's positioning in a fourth level within the National Government structure, under the Water Supply Board of the MAVDT. This was reflected in the failure of some processes and in discretionary changes in its management and work team.



1.5. Conclusion: Sector Achievements and Challenges

The sector reforms of the 1990s in the WSS sector in Colombia have generated positive results. Through them the country was able to set up a significant number of specialized operators, public and private, national and foreign, who have been operating part of the water and sanitation systems with greater efficiency and better management. In larger cities and in some smaller municipalities there has been significant progress in terms of coverage and quality.

Currently the country has a framework of laws, regulations, and sector policy that has stimulated a generation of reliable information for the sector, which defines the setting of tariffs for services based on their production costs, in this way sending adequate signals to rationalize consumption, with a positive impact in the environment, and making it possible to program the extensions of the systems' capacity with efficiency criteria.

The policy framework developed has been sufficiently broad for the emergence and coexistence of several schemes of private participation, corporate development, and competition. These have made it possible, for example, to restructure some public companies at a municipal level so that they are more competitive today, using flexible schemes of private-public partnership. This diversity also makes Colombia a special case, at least in the Latin American context.

The sector reforms have also generated a significant increase in the resources available for investment in the WSS sector. This increase is due to two main factors: the strengthening of the sector's decentralization process, with a significant increase in the transfers from the Nation to the municipalities, and the

use of tariffs as a natural source of financing for the sector, after the application of the tariff methodologies starting in 1996.

In terms of incentive mechanisms for the PSP, the creation of the PME in the MAVDT should be emphasized. Indeed, the PME made it possible to structure a solid and standardized model to establish arrangements with specialized operators in the sector, through competitive and free access processes, with objective selection criteria for effective competition at the time of defining access to the market. These processes, which have been successful in municipalities of different sizes, were accompanied by significant state contributions to co-finance investment and mechanisms which facilitate a better targeting of public resources in the sector.

The main challenge for the future may be to attract specialized operators to the smaller municipalities which do not currently have them. For that purpose, over the last two years the policy framework has been focused on promoting the sector's development, by using the departments as the intermediate institutional level between the National Government and the municipalities, to formulate programs with regional impact and promote comprehensive investment plans.

The idea behind this strategy is to accelerate the expansion of coverage and improve the quality of service, making it easier to meet the following policy guidelines: (i) effective inter-institutional coordination within each level and across different levels of Government; (ii) accelerating the sector's modernization throughout the country; (iii) taking advantage of economies of scale by structuring regional supply schemes; (iv) connecting the different sources of funding and facilitating the sector's access to credit; (v) exercising a better control over resources and compliance with regulations; and (vi) having comprehensive investment plans with regional perspective for the short, medium and long term.

2

Case Studies Based on Private Sector Participation in the Provision of Water Supply and Sanitation in Colombia



This chapter will present eight case studies, illustrating different examples of how private sector participation in the water sector was implemented in the Colombian context, highlighting the lessons learned from each.

First, the chapter presents the case of the city of Cartagena de Indias, where the operation notably improved the sector's efficiency, quality, and coverage once the mixed company was set up as service provider. In this case, the PSP process was easier after a regulatory framework had been established for the provision of residential public services.

Second, the case of CONHYDRA S.A. E.S.P. underlines the importance of the collaboration between state and private entities in order to achieve optimum efficiency indexes and increase the quality of services. Additionally, it illustrates the development of the provision of residential public services, a new business that did not exist before 1994. The case shows a situation where the local municipal administrations involved did not have a history of private participation nor did the municipalities have any experience in service provision. Up to that point, the operator had been regional and its management had mostly disregarded the local authority, following the logic of politicized administrations that sought their own interests and not those of the communities.

Third, the case of the city of Palmira shows how a business organization integrating private participation can be structured by following very strict technical parameters to ensure the provision of adequate water and sanitation services. For this purpose, in addition to political will, detailed knowledge of the sector and the city where the model is to be applied are required. Previous interaction with the potential operators to address their most relevant concerns is also necessary.

Fourth, the case of the city of Santa Marta is an atypical case of an early transformation into a private company, which occurred even before the National Public Services Law. It turned out to be an ineffective effort motivated more by clientelism than by service related motivations. As a consequence, the process ultimately led to the involvement of a specialized operator, which in turn resulted in service improvement. Even today however, the service conditions are not optimal for a departmental capital city with a high tourism potential that is not yet fully developed.

Fifth, the study will examine the regional scheme adopted in the Atlántico Department, with the company Triple A de Barranquilla leading the process, focusing on the impact that private intervention, i.e. operation and investment, has had on each of the service indicators. One of the facts that should be underlined in this analysis is that Triple A has completely separated the state from its functioning and policy decisions, both because of legal aspects and as a consequence of the drive of the company as manager of the upgraded WSS public services in Barranquilla. The economies of scale that make it possible to keep low operating costs, the results derived from prioritized and effective investments in socially vulnerable sectors, and an aggressive and continuous image management in the communities of beneficiaries can be considered key factors in the development of a regional process.

Sixth, we describe the case of the management and operation of Aguas de Manizales S.A. E.S.P. It focuses on the company's success because of excellent public management at a political, operational and technical level, without the participation of any specialized operator.

Seventh, the case of Proactiva Aguas de Montería highlights social resistance in the context of a successful case of concession.

Finally, the case of SERAQA S.A. E.S.P. presents a concession with shared finance as a response to an urgent need for water supply and service improvement in Tunja. This case underlines the importance of cooperation between public and private entities. In this case, the municipalities and the specialized operator worked together to achieve optimum efficiency indexes with an outstanding service to the communities served.



2.1. Cartagena de Indias

Since the 1960s, Empresas Públicas Municipales de Cartagena (EPMC) was not only the city's water and sanitation operator, but also operated other public services such as street cleaning and market squares. In 1992, EPMC faced a financial crisis due to very deficient performance and commercial management. It had little information, minimum measurements and few controls; its cumulative cash deficit amounted to US\$ 33 million; its revenues did not fully cover the expenses; only 45 percent of the total revenue portfolio was collected in 12 months; over 50 percent of the bills went uncollected; there was excess staff and a continuous turnover⁵⁶; there were approximately 15 employees per each 1000 connections; the network losses amounted to 52 percent due to the poor condition of infrastructure (30 percent was out of order) and the lack of investment; service was discontinuous with 20 percent of the users suffering from serious interruptions and 42 percent from intermediate interruptions.⁵⁷

The reform in the provision of water and sanitation services in the city of Cartagena was mainly driven by two players who sought to solve their own problems. First, EPMC's financial crisis had led the National Government to cover the company's deficit with the aim of guaranteeing the service. Second, the failures in the water and sanitation service led civil society and, more importantly, the hotels trade association, to make demands regarding service quality.⁵⁸

⁵⁶ Especially the management, which changed every time a new mayor took office.

⁵⁷ Data supplied by ACUACAR S.A.

⁵⁸ IADB (2000).

In 1993, when a new mayor took office in Cartagena de Indias, the National Government demanded a reform to solve the problems in the water and sanitation sector, in order to be able to finance the expansion of coverage to the poorer areas. Thus, the mayor initiated a process to carry out a structural reform of the water and sanitation service, based on the case of Barranquilla, where service was provided by a mixed capital company, the only example that existed at the time. This decision was opposed by the District Council, the body responsible for approving this type of reform.⁵⁹

Nevertheless, the mayor continued pursuing this objective and succeeded, as a first step, in creating a new company that was solely responsible for providing water and sanitation services: Empresas Públicas Distritales (EPD). The other services were transferred to other municipal agencies or outsourced to private companies. In spite of these changes, by late 1993 no substantial improvements had been achieved in terms of quality, efficiency, and coverage of the water and sanitation sector.⁶⁰

In 1994, based on the regulatory framework provided by Law 142 of 1994, it was decided that a private operator would provide the service under a mixed company arrangement. Thus, EPD was liquidated and an international tender was called to select a highly experienced operator in the provision of water and sanitation services. The bidding process was accelerated (lasting from May – December 1994), because the mayor wanted to complete the process before his term ended on December 31. Furthermore, his successor had been elected in October on a platform of opposites to the participation of a private operator and even more to that of an international operator.⁶¹

Of the three companies that purchased the bidding documents, only one – Aguas de Barcelona (from Spain) – made a proposal. The lack of interest of the other two companies⁶² could have been due to the situation of violence that the country was experiencing at the time, as well as to the short time available to submit a bid, the superficiality of the contract between the district and the private operator (the terms were very incomplete and relevant issues were not defined), the pressure of the municipal company's unions to preserve their jobs, the rejection to the participation of foreign operators on the part of civil society, or finally, to the fact that similar processes were under way in other Latin American countries.⁶³

59 IADB (2000).

60 IADB (2000).

61 IADB (2000); PPPUE (2001).

62 Compagnie Générale des Eaux of France and North East Water Company of the U.K.

63 IADB (2000).

In consequence, on December 30, 1994, a contract was signed between Aguas de Barcelona (AGBAR) and the District, creating Aguas de Cartagena S.A. E.S.P. (ACUACAR), a mixed company with the shareholding structure that is illustrated in Table 10.

Table 10. Capital Structure of ACUACAR S.A. E.S.P. (year 1994)

Shareholder	% Interest
District of Cartagena	10%
Aguas de Barcelona	50%
Private Shareholders	40%

Source: Aguas de Cartagena S.A. E.S.P

It is important to note that Cartagena had began looking for alternatives to improve the WSS sector, and the bidding process was initiated before the passing of Law 142 of 1994.⁶⁴

2.1.1. Most Relevant Contractual Aspects

In January 1995, a new mayor of Cartagena took office with the intention of putting an end to the reform carried out by the previous administration, but numerous national and international institutions opposed him. The World Bank was one of the most insistent on the participation of private operators as a condition for future loans to the District of Cartagena's WSS sector.⁶⁵ In spite of this, the mayor managed to have the contract signed in December 1994 revised and some of ACUACAR's rules were renegotiated. This process continued until June 1995 and the main modification concerned the distribution of the shares, as illustrated in Table 11.

Table 11. Structure of ACUACAR S.A. E.S.P.'s stock capital

Shareholder	% Modified Interest Year 1994	% Interest Year 2005
District of Cartagena	50.00%	50.00%
Aguas de Barcelona	45.91%	44.81%
Private shareholders	4.09%	5.19%

Source: Aguas de Cartagena S.A. E.S.P

⁶⁴ It was issued on July 11 and the bidding process began in May.

⁶⁵ PPPUE (2001).

On June 12, 1995 the District of Cartagena entered into a management contract with ACUACAR for the operation, maintenance and rehabilitation of the WSS systems for a period of 26 years, granting management autonomy to the operating partner. To fulfill its contractual obligations, ACUACAR is required to generate and maintain a minimum corporate capital of COP\$4 billion (approximately USD\$1.9 million in 2009).⁶⁶ The District entrusted ACUACAR with the management of the Water and Sanitation Master Plan.⁶⁷

In turn, ACUACAR executed a management contract with AGBAR whose commitments as operating partner were mainly the transfer of technology (computer programs and systems⁶⁸), recruitment of specialized staff and training of workers, in addition to improving the indicators for efficiency in operations and investments for the rehabilitation and replacement of networks and systems. The operator's remuneration for its work is a percentage of ACUACAR's income from tariff revenue⁶⁹, in addition to earnings on its ACUACAR shares.

The deed transferring and delivering management of the district's assets to ACUACAR was signed on June 20, 1995, indicating that their physical and material delivery would take place on June 25, the date on which ACUACAR started operating the water and sanitation service in Cartagena.

2.1.2. Condition of the Infrastructure

The reform to the provision of public residential services in Cartagena facilitated the process for the participation of private investors with a specialized operating partner (AGBAR), and contributed to the continuous improvement of the management indicators that are presented in this chapter. The charts illustrate the progress since the start of operations of ACUACAR and the tables compare some performance indicators of the public companies (EPD and EPMC, before 1995) and the mixed company (ACUACAR).

66 Data supplied by ACUACAR S.A.

67 PPPUE (2001).

68 Data supplied by ACUACAR S.A.

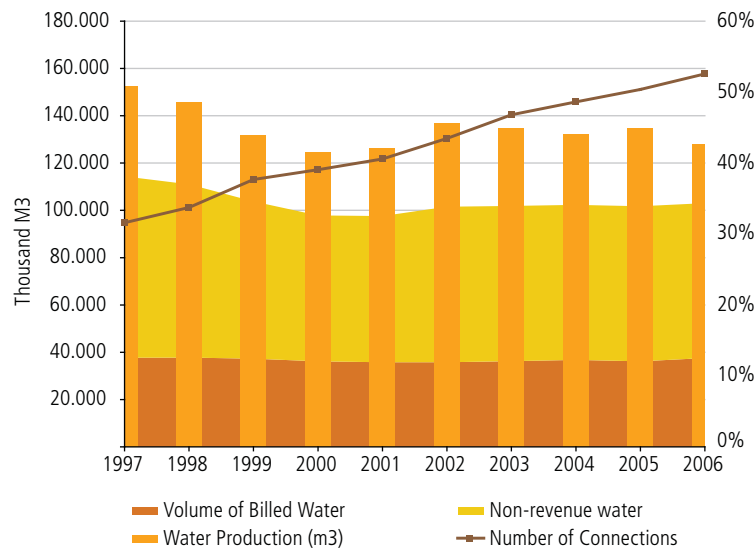
69 During the first four years of operation, AGBAR increased the percentage over the volume of billings gradually, 2.94 percent in the first year, 3.37 percent in the second year, 3.82 percent in the third year, 4.25 percent in the fourth year (IADB, 2000; PPPUE, 2001). From the fifth year onwards, 4.85 percent of the income (Source: data supplied by ACUACAR S.A.)

2.1.3. Changes in Service Delivery

Under ACUACAR's management, the production of raw (untreated) water was increased to 230,000m³ per day; the plant treatment capacity was expanded up to 270,000m³ per day; the treated water storage capacity was increased by 30,000m³; over 500 km of new water pipes and 400 km of new sanitation networks were installed; and meters that provide 100 percent reliable readings were installed, allowing for an increase of the total revenue portfolio in 12 months from 45 percent in 1995 to 92 percent in 2006.⁷⁰

Figure 6 shows the operator's efficiency. While the number of potable water connections was substantially augmented, the volume of water produced gradually decreased during the first five years of operation and later stabilized. In addition, the percent of unbilled water dropped from 52 percent in 1992 (prior to any reform) and 60 percent in 1995 (before ACUACAR began operating) to 42.6 percent in 2006. ACUACAR's commercial management and the investments in replacement of water pipes have contributed to the reduction of the percent of unaccounted for water. For example, in 1996, 1,105 repaired leaks were reported and in the year 2006, the number of repairs fell to 960.

Figure 6. Comparison Between Produced and Billed Water in Cartagena



Source: Aguas de Cartagena S.A. E.S.P

70 Data supplied by ACUACAR S.A.

2.1.4. Service Characteristics

Table 12 presents the evolution of the main management indicators in order to compare public management (up to 1995) to private management (since 1995) in the provision of Cartagena's water and sanitation service.

Table 12. Management Indicators of the Water and Sanitation Service in Cartagena

INDICATOR		1992	1996	2006
Service structure	Water coverage	72%	74.27%	99.90%
	Sanitation coverage	59%	62.16%	78.81%
	Micrometering Coverage	47%	72.21%	98.99%
Operation	No. of employees per connection / 1000 connections	9	4.58	2.87
	Network losses (% non-revenue water)	52%	51.09%	42.64%
Quality	Service continuity (No. hours/day)	7	20	23,9
Economic	Total revenues (Millions of pesos)	7,380 ⁶²	28,592	103,966
	Net result (Millions of pesos)	- 2,214	2,157	9,539
	Operating expenses (Millions of pesos)	3,616	27,973	83,184
	Middle and long term debt (Millions of pesos)	-	16,033	86,075

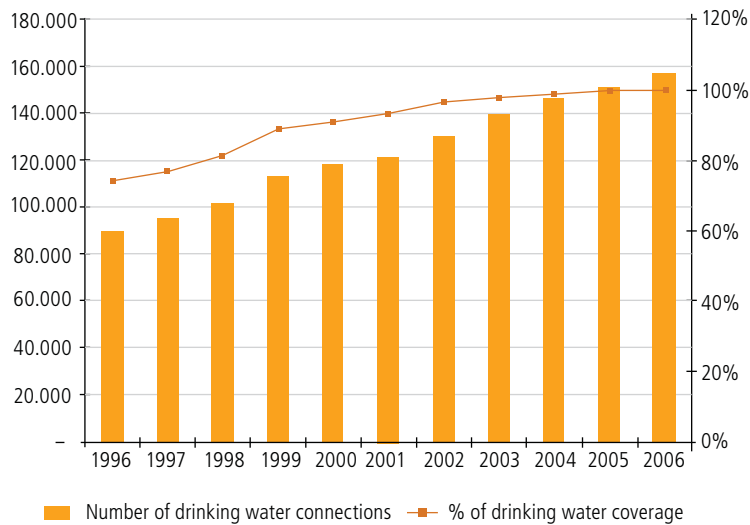
Source: Aguas de Cartagena S.A. E.S.P

Notes: The values for the year 1992 were obtained in dollars (Source: IADB, 2000; p. 5); the conversion into Colombian pesos was done based on the historical data of the website <http://www.wilkinsonpc.com.co/free/dolar-hoy.html>. For the years 1996 and 2006, the data were provided by ACUACAR S.A.

The Investment Master Plan designed for 1995-2004 focused on water and sanitation network expansion allowing the water system, with a coverage of 73.1 percent and 89,678 connections in 1995, to reach a coverage of 99.9 percent with 157,698 connections in 2006 (see Figure 7). To that end, it was necessary to install 550 km of new networks, with a present total length of distribution networks of 1,339 km.⁷¹

⁷¹ Sales revenues.

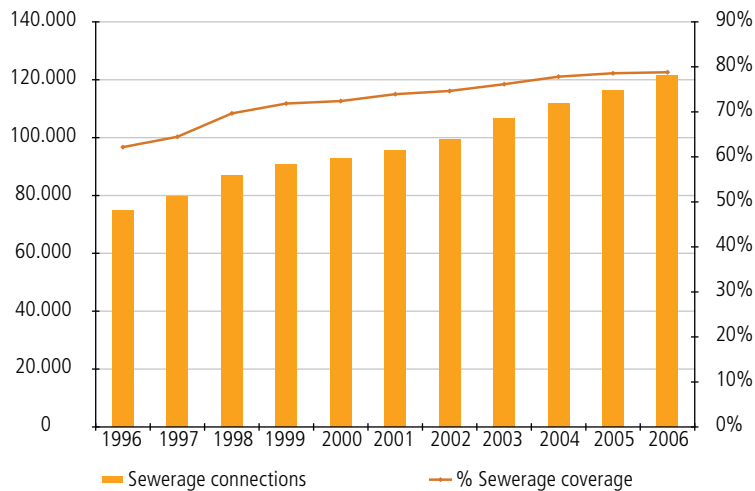
Figure 7. Evolution of Water Coverage in Cartagena



Source: Aguas de Cartagena S.A. E.S.P

Figure 8 illustrates the fact that in 1995, when the private operator had only recently begun its operation, the sanitation system had 60 percent coverage with 92,682 connections; while in 2006 it amounted to 78.55 percent with 121,477 connections. Currently, Cartagena has 946.4 km of sanitation networks installed, an additional 50 percent of what it had in 1995, which represented 350,000 connected inhabitants.

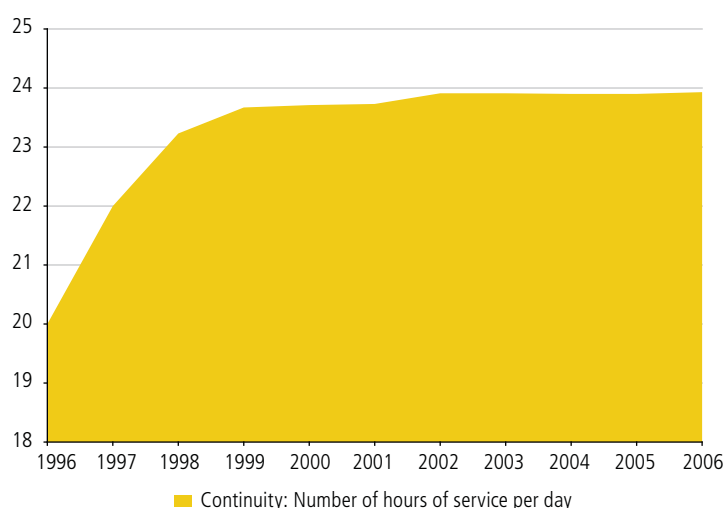
Figure 8. Evolution of Sanitation in Cartagena



Source: Aguas De Cartagena S.A. E.S.P

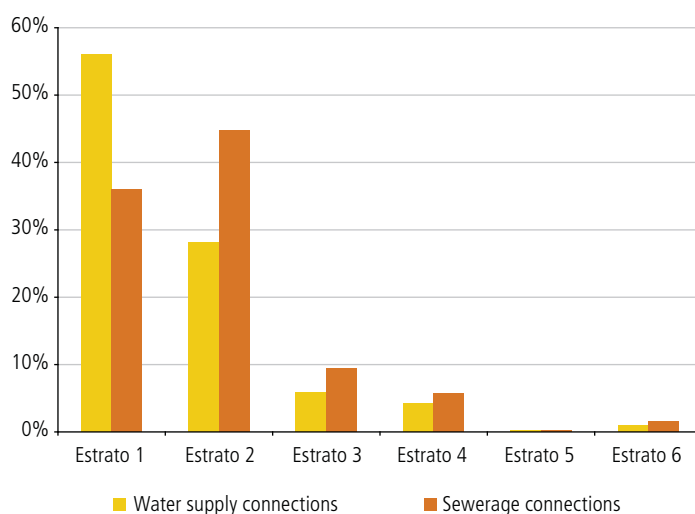
In 1994, the service continuity was seven hours per day. With the new operator entering in 1996, major improvements were achieved representing an increase in service continuity to an average of 20 hours of service per day, and then in 2002, to 23.9 hours per day. Figure 9 shows that the continuity of water supply went from 60 percent in 1995 to close to 100 percent in 2004. There has also been a substantial drop in the number of complaints: the number of claims went from an average of 2,400 per month in 1995 to only 589 during the year 2006, of which 70 percent are favorable to the company.

Figure 9. Evolution of the Water Service Continuity in Cartagena (hours/day)



Source: Aguas De Cartagena S.A. E.S.P

Figure 10 compares the main beneficiaries of the increased water and sanitation coverage achieved since the entrance of the private operator. 56 percent of the new subscribers of the water system belong to stratum 1; 28 percent to stratum 2 and 6 percent to stratum 3. As for the sanitation system, 36 percent of the new subscribers belong to stratum 1; 44.7 percent to stratum 2 and 9.4 percent to stratum 3.

Figure 10. Increase in Water and Sanitation Subscribers in Cartagena per stratum

Source: Aguas De Cartagena S.A. E.S.P

2.1.5. Investments

The Master Plan stipulated total investments of US\$236 million in the period 1995 – 2004, as follows: (i) investments in water services: US\$ 64.6 million (27 percent); and (ii) investments in sanitation: US\$171.4 million (73 percent). To develop this investment plan, ACUACAR has three important sources of financing: tariff revenues from the public service and loans of the Inter-American Development Bank and the World Bank.⁷² In addition, there is an Investment Fund designated for the expansion or improvement of the assets handed over by the district.⁷³

In 1996, ACUACAR adapted its tariffs based on the scheme approved by the Commission for the Regulation of Water Supply and Sanitation (*Comisión de Regulación de Agua Potable y Saneamiento Básico*, CRA). These regulations established that the portion of the tariff accounting for fixed costs had to be invested or used to pay for the costs of investments that had already been made; however, this did not apply to the case of companies that had no investment obligations.

ACUACAR and the district studied the situation and decided that ACUACAR would allocate the fixed cost portion of the tariff corresponding to expansion investments, but since this was not enough to cover the city's needs, they split between them the investment commitments. Therefore, it was agreed that ACUACAR

72 This arrangement was defined in April 1998.

73 Information supplied by ACUACAR S.A.

would bear the investments in the Master Plan corresponding to water services and the District would bear the investments corresponding to sanitation.

A program was presented for Cartagena's sanitation network discharging into the Bay with a total cost of US\$ 40.5 million, which was financed by the Inter-American Development Bank (IDB), through a loan of US\$ 24.3 million and the District of Cartagena with US\$ 16.2 million, through the mechanism of valuation and recognition of investments already executed by the district. The loan agreement signed between the IDB and the District of Cartagena de Indias in 1998 appointed Aguas de Cartagena as the project implementer. The execution of this project was completed in 2006.

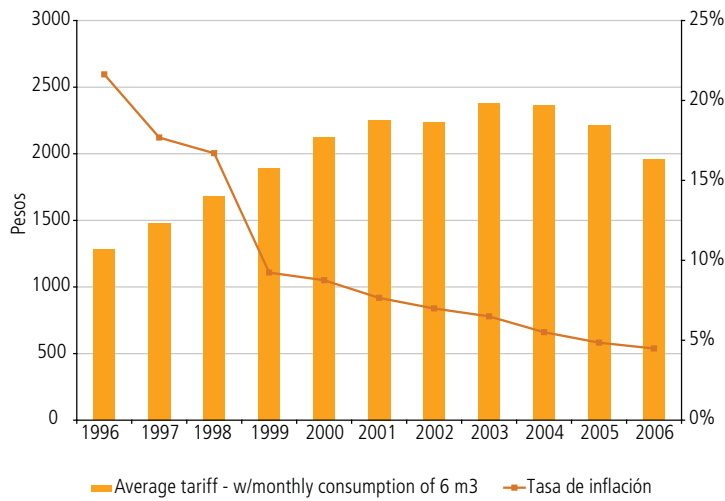
The International Bank for Reconstruction and Development (IBRD) granted a loan for US\$ 85 million to the District of Cartagena in 1999 to finance the Cartagena Water, Sewerage and Sanitation Project, with a total cost of US\$ 117.2 million. The remaining US\$ 31.2 million was financed with funding from the National Government, the District and Aguas de Cartagena for US\$ 20 million, US\$ 7.6 million and US\$ 4.6 million, respectively.

2.1.6. Evolution of Tariffs

When AGBAR began its operations, it was decided that it would maintain the same tariff that the Public District Companies had been charging during the second semester of 1995.⁷⁴ Beginning in 1996, the tariffs were increased as shown in Figure 11.

⁷⁴ Information supplied by ACUACAR S.A.

Figure 11. ACUACAR's Tariff Evolution

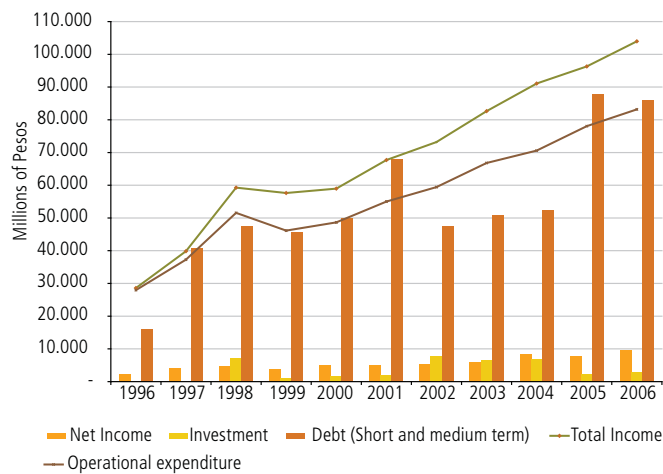


Source: Aguas De Cartagena S.A. E.S.P

2.1.7. Financial Performance

Figure 12 shows that Aguas de Cartagena began investing its own resources two years after the start of operations in the projects presented to the multilateral banks. The chart depicts the increase in total revenues and shows that from 1998 the increase in operating expenses does not follow the rate in the increase of revenues.

Figure 12. Financial Performance of ACUACAR During 10 Years of Operations



Source: Aguas De Cartagena S.A. E.S.P

2.1.8. Lessons Learned

The operation of the water and sanitation service in Cartagena de Indias notably improved its efficiency, quality, and coverage after the mixed company was set up to provide this service. The PSP process was easier once a regulatory framework had been established for the provision of residential public services. With this type of scheme, it is possible to safeguard the interests of its shareholders (public and private) without affecting the users and the company's financial sustainability.

The district's participation in the mixed company creates some instability from an organizational point of view, since every four years when there is a change of municipal administration new employees join the company, particularly in management positions. As a consequence, the private partner has a better knowledge of the company's structure and procedures, and holds a higher status.

Although there are citizen participation arrangements to oversee the provision of public services and state functions, civil society often fails to participate either due to lack of knowledge and/or promotion on behalf of the municipal, departmental and state authorities. Consequently, citizens do not effectively oversee the tariff increases, the condition of the investments, nor the condition of the existing infrastructure or that under construction.



2.2. CONHYDRA S.A. E.S.P.

This case study highlights the importance of the collaboration between state and private entities – represented in this case by the municipalities and the specialized operator – in order to achieve optimum efficiency indexes and increase the quality of services.

The case is interesting in that in the beginning, the local municipal administrations involved not only did not have a history of private participation but had no experience of service provision by the municipalities either. Up to that point, the operator had been regional and its management had mostly disregarded the local authority, following the logic of politicized administrations that sought their own interests and not those of the communities.

CONHYDRA S.A. E.S.P., as specialized operator, developed a good part of its capacity in operations associated with these municipalities. It is a clear example of the materialization of the business opportunities generated by Law 142 and one of the first initiatives of this type in the country.

2.2.1. The Beginning of Private Operation in Antioquia

The centralized character of the water and sanitation services in the country was especially manifest in Antioquia, one of the departments with the largest number of municipalities in the country – more than 120 – mostly operated by ACUAN-TIOQUIA, a state-owned regional entity under the INFOSPAL, a national institute that governed the sector since the 1950s.

ACUANTIOQUIA suffered a crisis largely generated by insufficient funds because of the winding down of INFOSPAL in 1987 and other administrative reasons. This led the Governor of Antioquia in 1994 to rethink the management, operation and investment scheme for which the entity was responsible. It was decided that management contracts would be granted to private companies through bidding processes, taking advantage of the new legal framework concerning the provision of public services, established by Law 142 of 1994.

The process would later demonstrate to be a good business, with adequate tariff conditions for the community and good service levels. However, the Government began by consulting with multinational water companies, which stated that it was impossible to provide good quality service under the economic conditions in which the business was presented, due to the socioeconomic situation of the municipalities included in the plan. This was another paradigm that was disproven once efficient operations with adequate profitability margins were obtained thanks to the entry of new business alternatives that better understood and adapted to the reality of the regions involved.

ACUANTIOQUIA opened a bidding process for the "operation, management and maintenance of the water and sanitation systems" for more than fifteen municipalities. It was a first phase to grant 42 of the systems for which the company was responsible. There were numerous interested parties, which in the end were reduced to just a few consulting and construction firms. Seven of the 42 systems were granted to CONHYDRA to cover different areas of Antioquia.

Several months into the execution of the agreement between CONHYDRA and ACUANTIOQUIA, the latter decided to transfer the contract to the municipalities that began to play an active part in the management of their services. This role has been crucial to strengthen the community's trust in private participation schemes and to gather support for the operator. Its management has more than 95 percent approval rates on average for the 7 municipalities in which it operates.

The ownership of the assets was transferred to the municipalities after an intense process of negotiation to agree on their real value, having been used for 30 years without an integral rehabilitation of the system's networks or components. The cost, paid in the end by the municipalities, was symbolic when compared to the cost of the system.

Without intending to experiment with variations in the agreements, ACUANTIOQUIA implemented a model scheme, which was applied for 15-year terms in each case. Table 13 highlights the most relevant characteristics.

Table 13. Selected Contractual Clauses for the Municipalities Operated by CONHYDRA

Main Contractual Obligations for the Operator	Main Contractual Obligations for the Contracting Entity
Providing water and sanitation service (where the latter exists), network maintenance, connection of new users, reading of meters, billing, collection, resolution of complaints and grievances.	Delivering all the components of the water and sanitation system for their management, operation and maintenance.
Distributing the resources generated by the payment of tariffs, following the order defined in the agreement: <ul style="list-style-type: none"> a. Operation expenses, maintenance and operation. b. Taxes and fees (includes CRA and SSPP). c. Operator remuneration. d. Amortization of credits chargeable to ACUANTIOQUIA. e. Payment of audit by ACUANTIOQUIA. f. Replacement, extension and emergency fund administered by ACUANTIOQUIA. 	Paying the agreed remuneration to the operator.
Carrying out all the investments and expenses required for the optimization, maintenance, replacement, extension and expansion of the systems chargeable to ACUANTIOQUIA E.S.P.	Providing the operator with the necessary resources for the expenses and the investments required to replace and expand the system according to the Master Plan for water and sanitation systems.

Source: Conhydra S.A. E.S.P.

In an interesting case of citizen participation, the community of Marinilla decided that a 15-year agreement was too long not to have periodic evaluations where the community could contribute and submit opinions. Therefore, it was decided that not only would the agreement be for just five years, renewable against targets, but also that the community would decide, together with the municipal administration, on the renewal of the agreement. Until 2007, no long-term extension had been approved, with only additions of maximum one year allowed, mainly due to administrative complexities and not to any reasons associated with non-compliance on the part of the operator.

As stated in the introduction, CONHYDRA was an operator with no background in this activity which resulted from a joint venture between a consulting firm and a construction firm, motivated by the opportunities offered by the departmental government to access agreements for the management of the water systems administered by ACUANTIOQUIA. The company's growth, which started from the development of its entire operational and management framework when the agreements had already been assigned, has been a learning process. Although it was somewhat

traumatic and went through necessary readjustments, the company has positioned itself as one of the most important private operators with exclusively domestic capital.

The water systems currently operated by CONHYDRA are described in Table 14.

Table 14. List of Systems Currently Operated by CONHYDRA

Owners and their Representatives	Type of agreement (Management, operation and maintenance of the...)	Location				Starting Date	End Date
		Municipality	Department	Inhabitants	Connections		
Turbo Municipality	Water system	Turbo	Antioquia	50,000	8,158	December 16, 1996	December 15, 2011
Chigorodó Municipality	Water and sanitation system	Chigorodó	Antioquia	36,000	6,985	October 20, 1997	October 19, 2012
Mutatá Municipality	Water system	Mutatá	Antioquia	4,000	694	October 20, 1997	October 19, 2012
Santafé de Antioquia Municipality	Water and sanitation system	Santa Fe de Antioquia	Antioquia	15,000	4,438	September 15, 1997	September 14, 2012
Aguas del Puerto	Water and sanitation system	Puerto Berrio	Antioquia	40,000	9,679	December 1st, 1997	November 30, 2012
Marinilla Municipality	Water and sanitation system	Marinilla	Antioquia	23,000	7,806	March 7, 1997	December 31, 2007
Sonsón Municipality	Water and sanitation system	Sonsón	Antioquia	19,000	5,016	July 1st, 1997	June 30, 2012
Acueducto El Tablazo Civic Corporation	Water system	Rionegro	Antioquia	2,000	440	March 1st, 2004	February 28, 2006
El Capiro Users Corporation	Water system	Rionegro	Antioquia	2,500	470	November 1st, 1998	October 30, 2008
Sociedad de Acueducto y Alcantarillado de Buenaventura, SAAB	Water and sanitation system*	Buenaventura	Valle del Cauca	350,000	63,000	January 1st, 2002	December 31, 2021

Source: Conhydra S.A. E.S.P.

Note: * Agreement developed in partnership with the firm HVM-Ingenieros and implemented under the corporate name of Hidropacifico S.A. E.S.P.

CONHYDRA has been in operation in the region for over ten years, during which time it has developed a management and development strategy that allows it to include access to other water and sanitation system operations in the Department in its short-term plans. This access to other system operations is relevant particularly within the framework of the recently promoted "Departmental Water Plans" that represent the national government's strategy to strengthen the sector and continue with the private participation schemes.

Aguas de Uraba (ADU), for example, is an entity resulting from the association of five municipalities of this Antioquean region, three of which are being operated by CONHYDRA. This arrangement has been a positive step towards regional consolidation and has demonstrated how useful it is to have a lean structure with low costs, adaptation capacity and a management model tested and adapted for the kind of population that makes up the Association. Seeing the National Government's interest in strengthening ADU, probably with the aim of demonstrating the importance of unifying the operation of several municipalities (regionalizing) in order to achieve better service conditions, there is also the possibility of showing that companies like CONHYDRA – or generally speaking, a water "SME" – can fit into that scheme.

As a result of this process, CONHYDRA was able to have the first operators with certified labor competency in Colombia in the water systems of the municipalities of Turbo, Chigorodo, Santa Fe de Antioquia, Puerto Berrio, Marinilla, and Sonson.

2.2.2. Condition of the Infrastructure

ACUANTIOQUIA transferred to CONHYDRA the systems of the municipalities that the latter now operates, with great deficiencies in most cases in terms of functioning, capacity and physical condition. The service continuity and the water quality had constant failures and the way in which the community's claims and complaints were handled generated a permanent feeling of dissatisfaction.

The geographic and demographic variety of the municipalities where CONHYDRA is present considerably affect different aspects of service provision. For example, water consumption is much higher in coastal areas than in the mountains due to climatic factors, but the population there has less of a willingness to pay. This implies that the emphasis will be different in each management scheme. In addition, it resulted in lower revenue for these coastal areas when ACUANTIOQUIA was the service provider and therefore the resources available for investment and infrastructure upgrading were almost nonexistent. This situation, on the other hand, would not be so prevalent in central municipalities within the Department. In summary, CONHYDRA received a system in better conditions in

Marinilla, Santa Fe de Antioquia, Sonson (Mountain range) but in a state of near disfunction in Chigordo, Turbo, and Mutata.

A. Santa Fe de Antioquia

Within the optimization plan, "minor" investments were required to solve the more evident problems of water quantity and quality. For example, 15 km of pipes were replaced in the water network, optimizing the service by sectors to avoid general shutdowns of the service at times of rationing. This municipality in particular had constant interruptions of the service on weekends. With the large scale arrival of tourists (up to three times the municipality's population), the system often collapsed and the service for all the population had to be shut down.

Moreover, meters were replaced in 1,300 households and education programs were started for the conservation and efficient use of water, as well as for the interpretation of the bill. This facilitated the collection process and promoted the acceptance of the operator by the municipal communities.

Commercially, the unaccounted for water program was implemented and improved. This indicator was at 40 percent in 1997, which is to say that of every 100 liters of potable water that were sent to the distribution network only 60 liters were billed. Today the IANC (unaccounted for water index) is 12.44 percent, a much lower index than the national recommended average level of 30 percent, and is even at the level of the best water systems in the world.

Within the company's investments and short-term actions as part of the agreement optimization plan, the following have been carried out in the municipality of Santa Fe de Antioquia: (i) adaptation of water intake structure to diminish its vulnerability and improve the continuity of the service; (ii) installation of 4500 meters of fiberglass adduction pipes which increased raw water transportation from 55 l/s to 105 l/s; (iii) replacement of sanitation networks and construction of 2,000 meters of collectors; and (iv) domestic sewage treatment plants for 90 percent of sewage produced in the municipality.

B. Marinilla

The operator implemented the Master Plan for Water and Sanitation at a cost of COP\$150 million (approximately US\$ 131,260 dollars in 1997, given the average exchange rate for that year) shortly after taking over. This plan has been the roadmap for the municipality's investments. Over this same period, the water intake, pumping station and conveyance line over the Barbacoa stream were built. The investment for

these works was COP\$650 million (approximately US\$568,800 in 1997); a considerably lower value than the one budgeted by ACUANTIOQUIA. This investment turned out to be effective, as it increased the intake capacity and diminished its vulnerability.

The first stage of the Master Plan for Water and Sanitation was carried out in 2000 and included plans for the construction of wastewater collectors, the north interceptor for wastewater, and the pumping station and wastewater treatment plant, as well as for the replacement of networks in the water system. The total investment of around COP\$4,200 million (approximately US\$2,007,099 in 2000) was contributed by the municipality, CORNARE (the CAR for the Rionegro-Nare region), the National Government and the system's revenues. These works made it possible to improve environmental conditions in the Municipality.⁷⁵

In 2002, COP\$538 million (approximately US\$208,531 in 2002) were invested in improving the water system in the western sector and in the Mercedes sector, as well as in the south interceptor and Cuenca de Oriente sanitation system.

The investments in 2003 amounted to COP\$212 million (approximately US\$72,158 in 2003), used in the replacement of the water and sanitation networks in several urban area sectors. In 2004, the filters of the water supply plant were upgraded and the second stage of the drying beds in the wastewater treatment plants was built.

C. Chigorodó

One of the cases where the systems were in poor conditions before the arrival of the specialized operator was Chigordo, a municipality in a violent area due to the existence of illegal armed groups. This situation is even more complex when the economic level of the population in this municipality of 58,600 inhabitants is taken into account, all of whom are in an alarming poverty situation, with no access to drinking water, scarce sanitation systems, and thus with a high vulnerability to gastrointestinal diseases.

The support of the departmental government and the central government, and the commitment and vision of the operator, have contributed to improvements in the quality of life of the population. The investment carried out, in conjunction with the accompanying successful marketing campaigns, made it possible to achieve a 70.3 percent water system coverage, a 30 percent coverage in sanitation networks, and a total of 6,985 connections to water and sanitation.

Today the municipality has service for 162.4 hours out of 168 hours per week and potable water (meeting quality standards) for a community that for 30

75 CONHYDRA S.A. E.S.P. Corporate web page (<http://www.conhydra.com/marinilla.php>).

years had consumed water with metals and color exceeding the acceptable limits for human consumption.

The National Government has provided more than COP\$500 million pesos (approximately US\$235,891 in 2007) which have been used mainly for the replacement of water networks and for optimization works in the treatment plant and respective pipelines.

These investments, plus the operator's management in the reduction of fraud, commercial management, and detection of losses have lowered the unaccounted for water index (IANC) from 56.0 percent in 1997 to 34.6 percent in 2006.

2.2.3. The Investments and their Impact

The Marinilla and Santa Fe de Antioquia systems, and most of the other municipalities, have had the support of external financial resources. Costs recovered through tariffs are not sufficient to cover all management costs, and capital subsidies are critical when the population is poor, especially for investment expansion.

These external resources have come strictly from contributions made by the government within the support work coordinated by the MAVDT. This funding has been possible because of the significant commitment of the municipalities to CONHYDRA's management, which ultimately targets the satisfaction of the users' needs.

The following table shows a comparison of the investments that were made annually in the systems of these two locations.

Table 15. Investments According to Source in the Municipalities of Marinilla and Santa Fe de Antioquia (in millions of pesos)

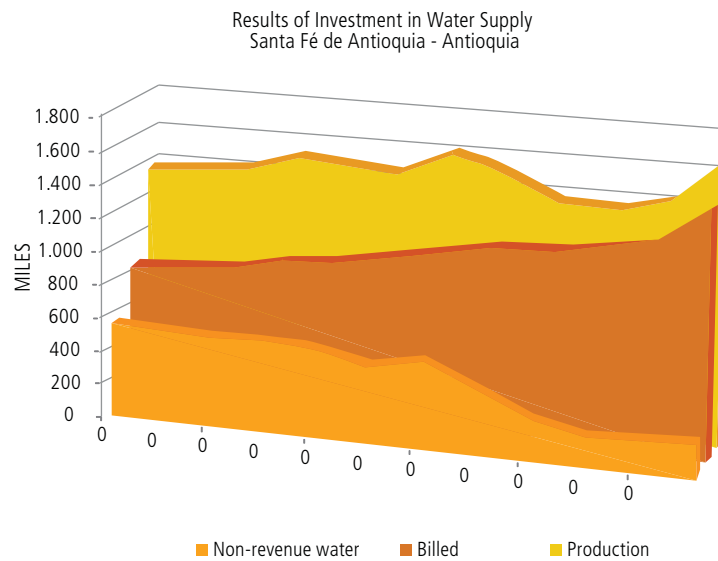
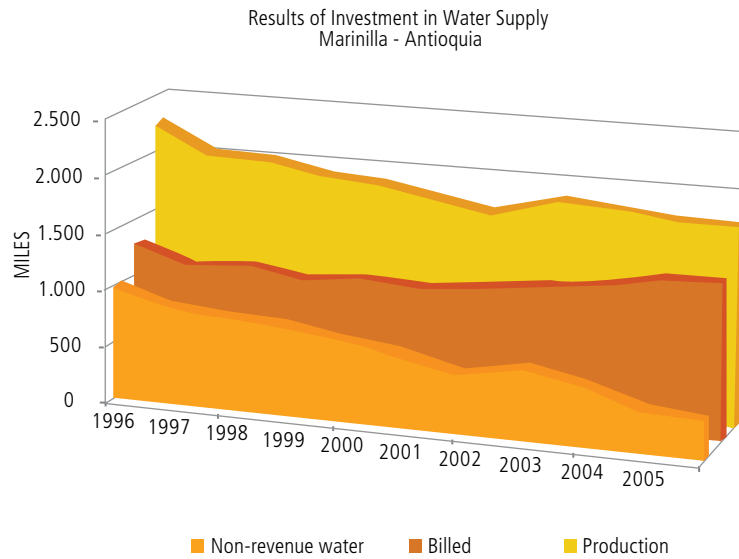
Municipalities	1998	1999	2000	2001	2002	2003	2004	2005	2006	TOTAL
Investments with own resources										
Marinilla	201.0	29.3	17.9	45.9	50.0	85.2	85.0	72.3	330.0	916.8
Santa Fe	12.8	32.4	158.5	186.4	161.0	322.0	339.0	886.2	186.4	2,284.9
Investments With External Resources										
Marinilla			4,085.0	0	335.0	145.1	0	35.0	271.0	4,871.1
Santa Fe			0	0	119.0	1,050.0	0	0	0	1,169.0
Total Investments										
Marinilla	201.0	29.3	4,102.9	45.9	385.0	230.3	85.0	107.4	601.0	5,787.9
Santa Fe	12.8	32.4	158.5	186.4	280.0	1,372.0	339.0	886.2	186.4	3,453.9

Source: Conhydra S.A. E.S.P.

These two municipalities have benefitted from direct subsidies from the central government and departments. In the case of Marinilla, for example, these external contributions are well in excess of the investment component resulting from tariff revenues ("Investments with Own Resources"). This approach has been fundamental, and it is necessary to continue with it to provide sustainability to systems where the cross subsidy component is minimal. The municipalities, in turn, "spend" their contributions in subsidies to the poorest communities.

As can be inferred from Figure 13, both Marinilla and Santa Fe de Antioquia were able to optimize production. In the first case, the quantity of water from the plant was reduced and billing was increased, reducing the inefficiency that existed in the operation of the treatment system. In the second case, where the water losses were lower (the system was in better condition and there was a lower incidence of fraud), the emphasis was on increasing production in order to achieve significant increases in billing.

Figure 13. Results of Investment in Water Production and Treatment in Marinilla and Santa Fe de Antioquia

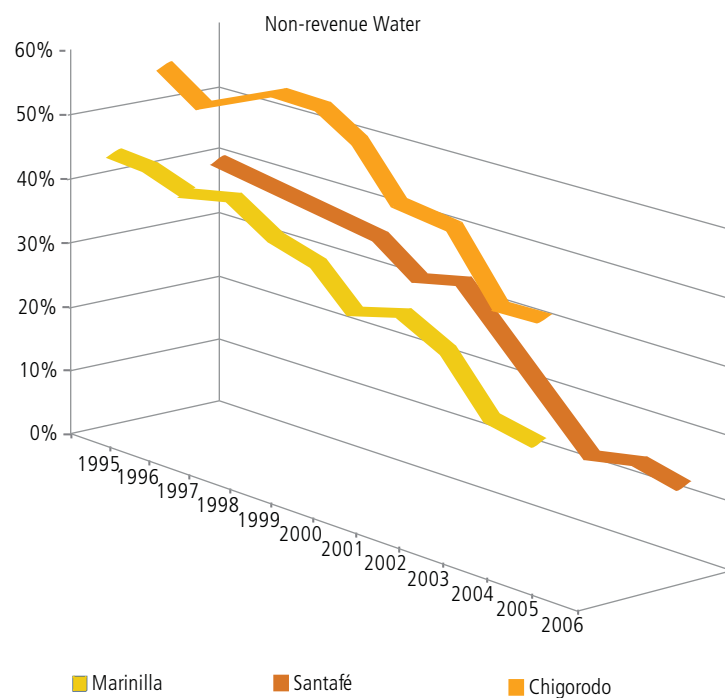


Source: Conhydra S.A. E.S.P.

One of the aspects that best reflects the success of private participation in this region, apart from the acceptance of the community and the satisfaction of the local authorities with the operator, is the decrease in the unaccounted for water index to the levels obtained in Marinilla, Santa Fe, and Chigorodo.

According to many specialists, the unaccounted for water index is precisely the indicator that reflects the good or poor management of the operator in a particular system, even if there are countless variables that can affect it. The size of the system or network length is one of them, and in this case, it undoubtedly favors the operator. Nonetheless, the operator's management has been adequately controlled and the consequent results are evident. In Figure 14 the reduction trend achieved is evident, with current levels that can be rated as outstanding.

Figure 14. Unaccounted for Water in Three Representative Municipalities of Antioquia



Source: Conhydra S.A. E.S.P.

The private operator's arrival in the municipality of Marinilla had a significant impact on the water system coverage indicator. It can be inferred that there were households in the municipality that had no official service from the

local water system while ACUANTIOQUIA was operating. With simple measures, in some cases new secondary networks, these households were connected and included in the billing of the new company. The coverage indicator in 1996 was 78 percent with 5,585 water supply connections, in 1997 it was 94 percent with 6,092 connections and in 2004 it reached 100 percent with 7,086.

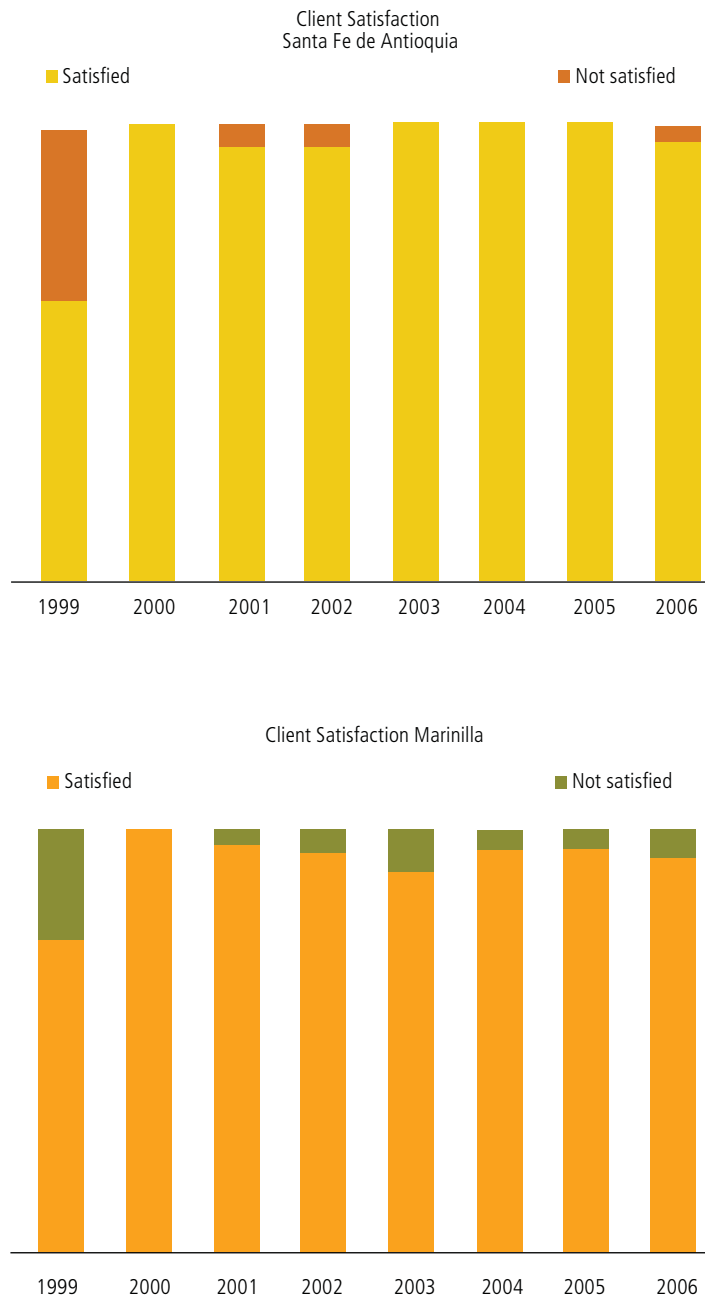
2.2.4. Management Aspects

Due to the operator's investments, the emphasis of CONHYDRA's actions has focused on management aspects. Considering that most customers have a low socio-economic stratification (marginal tariffs, low payment capacity, high claim index) it is therefore necessary to reach the highest levels of productivity in order to guarantee the sustainability of the business, for the municipality and for the operator.

Because of reasons already mentioned, the economies of scale have not materialized in Antioquia like in other departments in the country. CONHYDRA turned this obstacle into an opportunity, centralizing the 10 operations it currently has in Medellín (capital of the Department). From Medellín, it is possible to plan and control management, billing, and collection, among many other commercial, operative and administrative activities, while offering at the same time specialized services not frequently used in specific municipalities. The software development carried out there has contributed largely to the achievement of the efficiency shown in the indicators that follow for three of the municipalities served.

Constant community engagement has been a key element in the strengthening of the water and sanitation system management in these respective locations. The community's open support of the operator in most cases, and the demands made through the municipal authorities have created a valid participation scheme in the most strategic decisions and even in the management evaluation.

Figure 15. Results of Annual Survey of Customer Satisfaction with the Water and Sanitation System in Santa Fe de Antioquia and Marinilla



Source: Conhydra S.A. E.S.P.

The efforts made by CONHYDRA and by the municipality of Santa Fe de Antioquia have evidently had an effect on the way the users perceive the service.

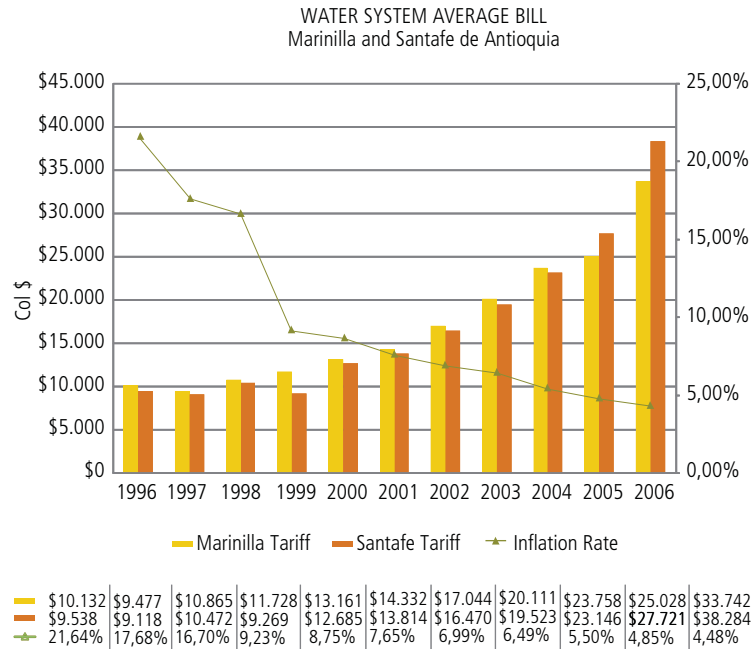
One of the most interesting cases found in this analysis concerning state-private collaboration and performed by CONHYDRA's management in the Antioquia municipalities was the small village of El Capiro. This voluntarily organized community decided to make use of the operator to improve their management and obtain a better level of water and sanitation services, for both their commercial and productive activities and for their daily domestic consumption.

This public-private participation is noteworthy because of the high community participation in this case, organized in the Corporation of Users of the El Capiro Water System, a non-profit entity trying to efficiently satisfy the population's most elemental needs. Initially, this group of rural inhabitants in the municipality of Rionegro (Antioquia) from varied socioeconomic strata operated the village water system with local citizens, a system built on their own initiative and with their own resources, without the support of municipal authorities, at least economically. Since 1996, the number of water connections has doubled.

2.2.5. Tariffs and Subsidies

Raising tariffs has been a key element to the sustainability of the operators and the viability of the reform effort. The water system tariff has evolved over the last ten years with increases well in excess of inflation, with an average increase of 20 percent between 2002 and 2007, while average annual inflation was lower than 5 percent. These increases have made it possible to implement the investment schemes.

Figure 16. Evolution of Water System Average Bill for Stratum 4 in Marinilla and Santa Fe de Antioquia (1996-2006)



Source: Conhydra S.A. E.S.P.

According to information supplied by the operator, the municipalities do not have the Solidarity Fund (*Fondos de Solidaridad y Redistribución de Ingresos*) ordered by the Government to receive subsidies for the less favored communities and, therefore, that amount must come from the service itself. This generates a significant deficit in the services, estimated at COP\$10,000 million (approximately US\$4,125,165 in 2006) for the period of 1996 to 2006. Apart from this, most of these localities do not have subscribers of high socioeconomic levels (in Colombia, strata 5 and 6), nor do they have significant commercial or industrial users that might enable cross subsidies to compensate for this negative value. This situation undoubtedly conspires against the possibility of investing in the systems, which despite these dynamics have achieved sustainability and have seen improvement.

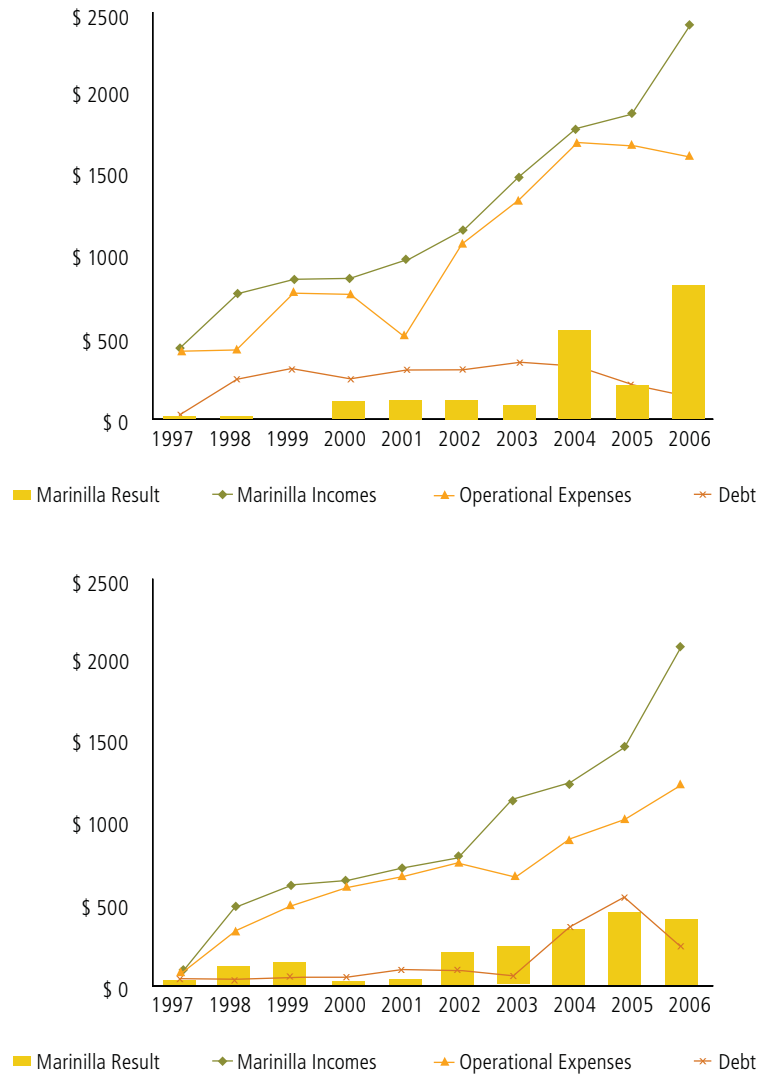
2.2.6. Financial Performance

In a scenario where the operator has good financial indicators, like those reported by CONHYDRA after ten years of operation, it is evident that private participation in the water service and sanitation service sector is a profitable activity. The ad-

vantage is as much for the active players as for the municipalities, and ultimately for the users receiving the service and benefitting from having full access to water and sanitation.

Aside from the operator's financial indicators, the municipalities of Marinilla and Santa Fe report excellent results and show the following performance trends.

Figure 17. Financial Performance



Source: Conhydra S.A. E.S.P.

2.2.7. Lessons Learned

The results obtained and lessons learned in each one of the Antioquia municipalities operated by CONHYDRA – under contractual schemes that did not involve large initial investments and which have systems requiring minor maintenance – should guide the decisions of municipalities in the country that still suffer from the poor quality of their water system. Such local administrations, as well as the communities are poorly affected as they have to constantly assign resources to “put out fires” due to emergencies in the functioning of the system.

The performance of CONHYDRA as a specialized operator provides an important case study because of the positive results obtained in complex scenarios concerning income, varying conditions of infrastructure and service before its arrival, and involving external pressures and violence. The coordination and cooperation with local authorities and communities, in a clear example of public-private participation for common growth and strengthening, is a key factor in this case. The conclusion to be drawn is that neither an operator exclusively focused on generating profits nor an administration solely dedicated to enforcing compliance with an agreement or pleasing the community, makes sense. Mutual collaboration, joint resolution of difficulties and mutual acceptance of each party's interests favor this scheme.

Lastly, the CONHYDRA–municipalities team should be acknowledged as a clear example of the change in the country's policy, through the inclusion in the 1991 Constitution of market elements that favored free competition in the provision of residential public services. The opportunities generated by these structural changes in market conditions foster not only transparency in the granting of agreements based on free competition, but also the creation of jobs and new business sources for the companies, always for the sake of the economic strengthening of the country and of the communities in each municipality.



2.3. Palmira

This case, referring to the city of Palmira, shows how a business organization integrating private participation can be structured by following very strict technical parameters to ensure the provision of adequate water and sanitation services. For this purpose, in addition to political will, detailed knowledge of the sector and the city where the model is to be applied are required. Previous interaction with the potential operators to address their most relevant concerns is also necessary.

2.3.1. The Business Model

As in almost all the cities in the country, the enactment of Law 142 of 1994 was a timely tool to begin a process of transformation in the water and sanitation services sector and to begin to solve serious and complex problems resulting from the poor management of public services companies in Colombia.

In Palmira, EMPalmira was in charge of the system's management. EMPalmira was a municipal company that was not immune to the corrupt and clientelistic practices of the regional "chieftains" and, as a consequence, was burdened by a heavy financial load that it could not sustain. In addition, its piping system had deteriorated to a degree that made it impossible to recover whatever few investments had been made and it was under pressure from the communities that received a poor and low quality service.

This situation, which undermined Palmira's potential as an economically strategic city in the Cauca Valley, a highly productive region for the country, led the

local administration to contract the business feasibility studies required by Law 142 of 1994, before initiating a transformation process involving private agents. This led to the beginning of the transformation of EMPalmira. The first step was separating the public services it provided (telephone, street cleaning, water and sanitation and public market). Next, actions were taken to execute a "delegated management contract to improve the quality and efficiency of the water and sanitation services in the municipality", according to the authorization granted by the Municipal Council to the city's Mayor – Agreement No. 100 of 1996.

The bidding process that preceded the contract awarded in 1996 had the participation of the largest international water firms, improving confidence regarding access to a high level of service for citizens under any of the options. The firm selected to participate in the company with the municipality, which was already represented in EMPalmira, was Lyonnaise des Eaux Services Associés (LYSA), a French company with a wide experience in the international water market and operations in several continents.

Table 16 shows the capital stock of the new company, ACUAVIVA S.A. E.S.P. and its evolution over time.

Table 16. Evolution of the Shareholding Interests in ACUAVIVA

	Original	May 06
Empalmira	39.0 %	- 0 -
Municipality	1.0 %	40.1 %
LYSA	36.34 %	49.62 %
Other (private sector)	23.66 %	10.28 %

Source: ACUAVIVA S.A. E.S.P

In this process, there are two significant points that should be highlighted: (i) The company EMPALMIRA remained an active partner in the newly created ACUAVIVA, providing an indication of the permanence of the municipality; and (ii) most of the local partners were businessmen in the region, giving the citizens' perspective of the transformation and, at the same time, due to their representative participation in the company, serving as a neutral element between the other two partners, inherently opposed in their business philosophy.

Before the negotiation process, a preliminary shareholders' agreement was signed on December 18, 1996, formalizing the terms under which the new company, ACUAVIVA, would operate and establishing LYSA's role as operator, its compensation

and the contractual objectives inherent to its responsibility, coverage increases, collection levels, unaccounted for water control and management optimization.

Naturally, the legal process carried out in Palmira clearly established the players, timing, costs and conditions under which the agreements should be signed. The three agreements that were signed separated the duties and stages in the process, but did not exclude the specialized operator from any of them. This can be understood as having a single purpose: facilitating the participation of a highly skilled technical player in all the process stages, i.e. business organization, technical and financial planning, and administration and operation. The high risk of opposing interests could only be overcome with the operator's dedication and commitment, and this has consistently been the case.

Specifically, the following agreements were signed:

A. Lease agreement between the municipality and ACUAVIVA:

As an obvious condition to perform its corporate purpose, ACUAVIVA needed to receive under lease, among several options, the water and sanitation system for a fifteen-year term with monthly fees established therein.

In June, 2007 the company's management had submitted to the Municipal Government of Palmira for its consideration and possible debate with the Municipal Council, a proposed extension for an additional term (until 2027), arguing that the company (ACUAVIVA) needs to acquire debt in order to finance the sanitation works required by the Regional Environmental Authority, to comply with the performance of the Sanitation and Disposal Management Plan proposed by the company in December 2005. The company has called this program "Palmira 2027 Water and Sanitation Project."

The most relevant features of the agreement are:

- EMPalmira delivered to ACUAVIVA under lease the entire existing infrastructure and any facilities that could be built as a result of the city's growth or an increase in the number of users, for use exclusively to provide services to the residents of Palmira.
- ACUAVIVA will make annual payments for fifteen years; during the first nine years for the equivalent in Colombian pesos of US\$ 815,000 as of July 2007, adjusted for inflation less 11 points in the first three years and for inflation plus three points in years four to nine; US\$ 790,000 in the tenth year of the agreement; US\$ 868,000 in the eleventh year; US\$ 973,000 in the twelfth year; US\$ 1,050,000 in the thirteenth year and US\$ 1,052,000 in last two years.

- Under this agreement and as a result of the annual fee adjustment mechanism, EMPalmira and the Municipality of Palmira, maintaining their 40 percent ownership interest, will have the right to 60 percent of the company's profits, from the eleventh year of operations until the 15th year.
- ACUAVIVA acquired the obligation to negotiate on behalf of the Municipality of Palmira the amount of COP\$10 million of 1997 (equivalent to US\$ 5.5 million as of 2007) for the sole purpose of subrogating or settling both the financial liabilities borne by the lessor and its labor-related liabilities so that the assets could be delivered free and clear from any liens. The above-mentioned sum would be partially guaranteed by the lease fees and EMPalmira's obligation to contribute COP\$3 million (as of 1997) by pledging the National Government's revenues to the Municipality of Palmira.

As noted, this first agreement established the partnership conditions, but imposed no payment to be admitted as a partner, taking into consideration the high amounts that needed to be invested in the optimization of the system and, in general, in the proposed Investment Plan. All these investments would be recovered through tariffs.

B. Agreement for technical and engineering advice and preparation of the master plan

The Draft Minutes of a Shareholders' Meeting of the newly created ACUAVIVA S.A. E.S.P. authorized a contract for the technical and supply activities mentioned below, with the firms SAFEGE and AQUA TECHNIQUE, which belong to the same group as LYSA:

- Technical assistance agreement to improve the water and sanitation systems.
- Implementation of a geographic information system for water and sanitation services, a telemetry system for the facilities and the water supply network and a network simulation model.
- Establishment of a rainwater collection system to separate it from wastewater in fewer than five years.
- Agreement for the supply of equipment to improve water and sanitation systems.

C. Delegated administration agreement between LYSA and ACUAVIVA

The agreement's structural elements were service targets, most importantly:

- To reduce the municipality's unaccounted for water index to 20 percent of the production volume over five years;
- To increase the portfolio collection rate to 85 percent;
- To increase the population's water and sanitation coverage to 100 percent within five years;
- To increase the continuity to 100 percent over five years; and
- To treat 90 percent of the wastewater within fewer than five years.

It should be noted that the business model approach of the Municipality of Palmira openly states the intention of counting on a very strong strategic partner in the areas of engineering, administration and operation of similar systems. This is reflected in the very demanding performance targets that were set for the contractor and which could only be agreed upon on the basis of knowing the potential revenue from tariffs. The outstanding performance indicators that ACUAVIVA has achieved during its management period also result from this excellent business concept.

2.3.2. Investments and Their Impact

The conditions in which the specialized operator found the water and sanitation system may account for the targets defined in the agreement but, at the same time, explain the significant investments required.

The operating indexes in Palmira at the time are presented in Table 17.

Table 17. Operating Indicators in Palmira (2007)

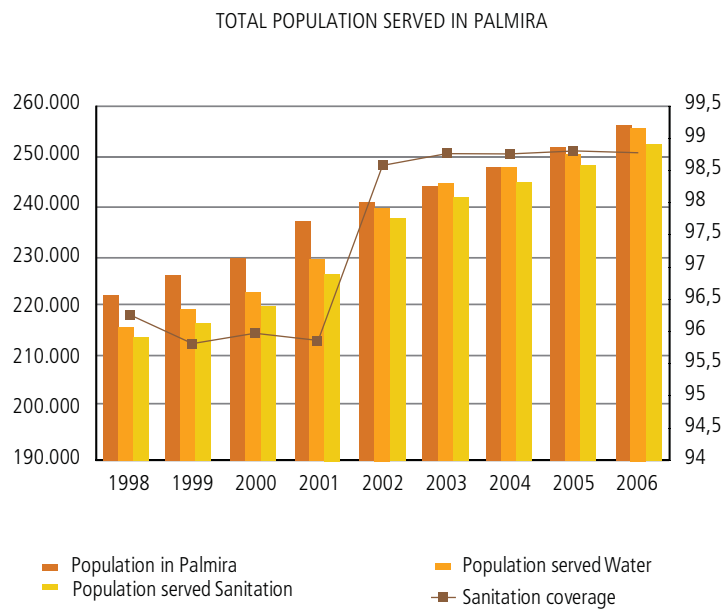
Indicator	Value
Water coverage	85%
Sewerage coverage	77%
Unaccounted for water index	42%
Collection %	68%
Service continuity	19 hours a day

Source: ACUAVIVA S.A. E.S.P.

Likewise, it is understood that the technical assistance agreement signed for the initial period of the agreement was justified by the need to properly plan the investments and achieve the best operating and service results in the shortest possible time. The technical support of LYSA and its consulting group was crucial in this sense, and resulted in very detailed calibrated modeling, which today is reflected in ACUAVIVA's achievements.

This benefit has also been transferred to local officials who, after several years of training, occupy most of the company's executive positions, especially at the senior level. One of LYSA's policies, according to its corporate literature, is to adjust its intervention level based on the attainment of achievements and the fulfillment of the targets: it withdraws gradually as the local team becomes technically independent. However, it remains a partner and provides value to the business approach.

Figure 18. Evolution of the Population with Water and Sanitation Services

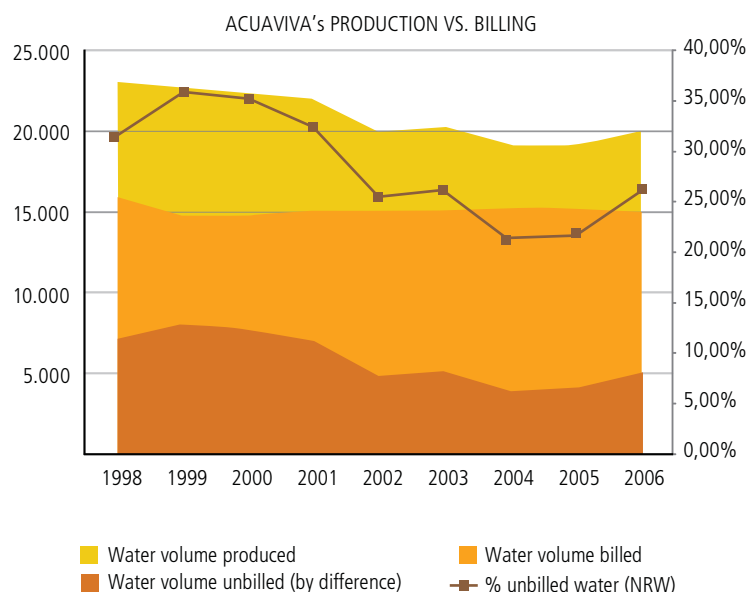


Source: Acuaviva S.A. E.S.P.

Figure 18 shows the change in the trend (red line) from the fourth year onward. This was the period needed to plan, procure and build the new works to reach new sanitation users, unlike water users, whose connections were made gradually.

One of the most outstanding aspects of ACUAVIVA's management over ten years is the significant and consistent decline of the unaccounted for water index, due to significant technical work. As a result, on average water losses are currently below 25 percent, and as low as 21 percent, an outstanding performance indicator when compared to the results obtained in other cities in the country.

Figure 19. Water Volume Produced and Billed during ACUAVIVA's Management Term



Source: Acuviva S.A. E.S.P.

An example of the important work carried out during this period is the increase in the number of users achieved while reducing the production levels of treated water. This is evidence of optimization of the use of resources and offers a guarantee of efficiency to the inhabitants of Palmira: a 38 percent increase in the number of users, from 42,000 users in 1998 to 58,000 at the end of 2006.

The 15 percent reduction in water production in the period 1998 – 2006 together with a 38 percent increase in the number of users in the same period confirm the benefit of having a private operator, essentially profit driven instead of an inefficient entity offering no value to the end user.

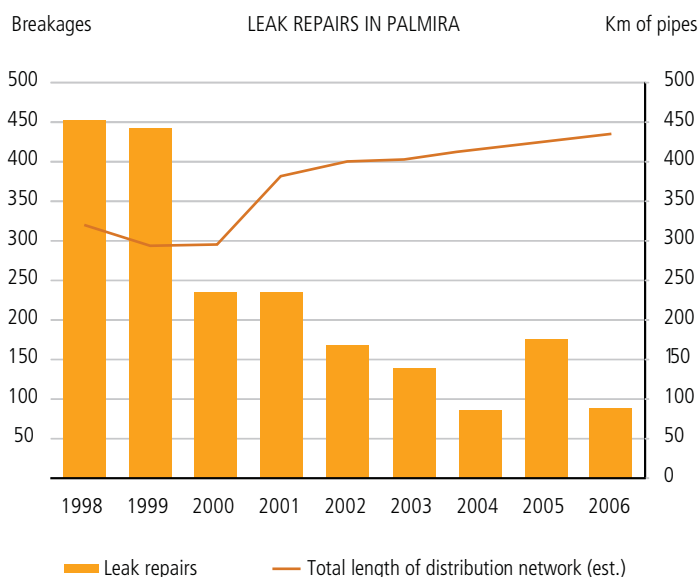
2.3.3. Management Issues Arising from the Business Model

The relationship between the business model adopted by a specific territorial entity and the management results are unequivocally reflected in the case of Palmira. Although the natural incentive to attain the targets in a company with private participation are increased revenues, which determine the level of an operator's compensation, the design of the contract for this city includes requirements for outstanding achievements by the private agent.

The indicator of repaired leaks points out how critical the situation was. This indicator reflects a categorical decrease in the number of monthly leaks as compared to the situation under a municipal operator. Although the reason is not the same in all cases, usually the water systems managed by this type of municipal company were in such a condition of disrepair and neglect that the pipes carried less water than was lost. In addition to this, the time to repair damages was usually one or two days in cities the size of Palmira, as compared to the current four hours.

In Palmira the situation was similar to that in the rest of the country. The number of leaks per year was 450 in 1998, implying an average in excess of 37 leaks per month. ACUAVIVA currently repairs fewer than seven leaks per month. This has implications in terms of losses while freeing operating resources to allocate them to activities that add further value.

Figure 20. Evolution of the leak repair indicator in Palmira, Valle del Cauca



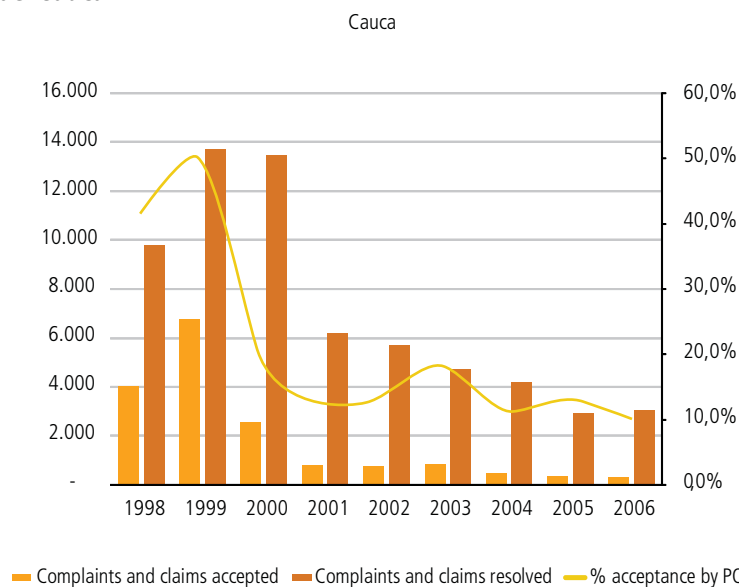
Source: Acuaviva S.A. E.S.P

Certain anecdotes provided by ACUAVIVA refer to situations experienced by the company when the municipality was in charge of the operations. Undoubtedly they can be taken as representative of many of the country's state companies. For example, workers were instructed not to repair leaks unless they were in the neighborhoods of their political supporters, or took more time to repair leaks in order to collect overtime. This undoubtedly affected the company's finances, as it generated additional costs agreed upon between the workers' union and the politicians that managed the company. Chaos reigned and nobody assumed responsibility beyond personal or political interests.

In addition to the implementation of technical elements to optimize the operation of a water system, it is necessary to design strategies so that the community's satisfaction results in higher revenues for the company. These strategies include the establishment of new connections, more efficient metering, higher collection percentages, portfolio recovery and more accurate business processes, such as readings with fewer errors, and timely delivery of bills.

- In this regard, the case of ACUAVIVA presents the following results:
- In 1997 it took EMPalmira over 15 days to connect a new user, while at present, ACUAVIVA meets this requirement in only four days;
- ACUAVIVA employs a unique variable as an indicator no common in other companies. There is a ratio between complaints addressed and accepted, which accurately reflects service problems. The basis for this measurement is that there will always be unsatisfied customers but, to the extent that the complaint is justified in a process supported by the Superintendence of Public Utilities, the problem is no longer the company's. The number of complaints received has diminished from 9,766 in 1998 to 3,010 in 2006, i.e. a 70 percent reduction, while the percentage of justified complaints is currently 9.8 percent, compared to 41.3 percent in 1997;
- Micrometering went from 72 percent in 1997 to 100 percent properly operating meters by 2006. This impacts the company's finances and also positively affects the reduction of the unaccounted for water index.
- Another operating parameter which reflects the management optimization is the average of readings per worker-day, which grew from 210 to 490 in the period 1997-2006, with a 0.11 percent reading error rate.

Figure 21. Evolution of Requests, Complaints, and Claims in Palmira, Valle del Cauca



Source: *Acuaviva S.A. E.S.P.*

Acceptance of the arrangement by the community has several implications that should be highlighted. The service provided by ACUAVIVA, which ensures a continuous water supply is in contrast to the situation only ten years ago and there is a clearly favorable trend in terms of acceptance.

On the other hand, due to the absence of a serious company while the system was managed by EMPalmira people were not accustomed to having their service cut off for non-payment, among other things. As mentioned by individuals who currently work at ACUAVIVA and were previously with the state company, people were accustomed to having the same defective meter for 20 years, with constant sub-billing. One of ACUAVIVA's strategies, common in most privately-owned companies in the country, is that meters must be changed whenever there is evidence that they are not measuring properly. In fact, ACUAVIVA was the first company in the western region and one of the first ones in Colombia to have a meter test bench certified by the Superintendence of Trade and Industry, in support of this policy.

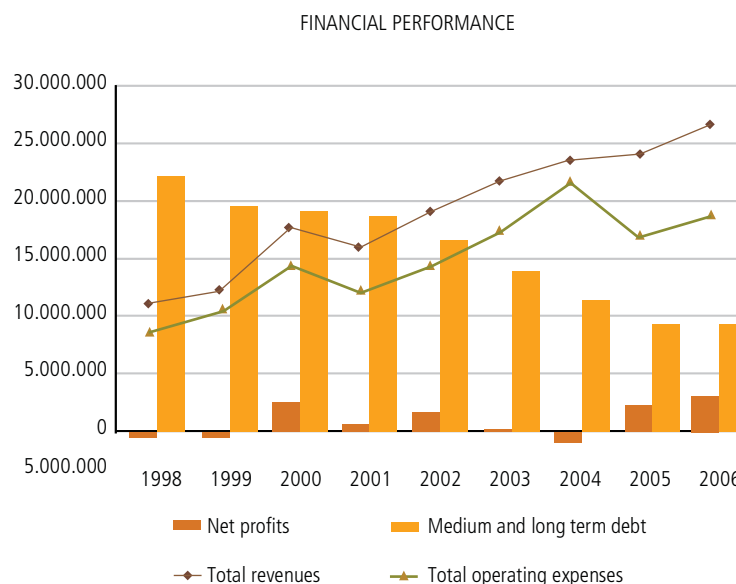
2.3.4. Financial Performance

The source of the company's high level of debt is clear. The contractual terms did not require the investor to contribute funds, but to take the necessary actions to

ensure the flow of resources in accordance with the investment plan attached to the agreement, including working capital, which is reflected in the level of debt shown in Figure 22.

These resources allowed for the implementation of very effective measures to optimize the system and the number of users has grown constantly.

Figure 22. Evolution of ACUAVIVA's Financial Performance over 10 Years of Operation and Management



Source: Acuaviva S.A. E.S.P.

2.3.5. Lessons Learned

The business model used by Palmira, based strictly on meeting technical and service interests, with profitability for ACUAVIVA's shareholders, can be considered successful and to a large extent responsible for the achievements attained in ten years of service. It is important to note, however, that the model may have responded to specific city conditions and may not be applicable to other cities.

Although the shareholders have been guided by economic interests, the experience transferred from other equally successful cases by the specialized operator LYSA, in conjunction with the citizen's view contributed by the local partners, have resulted in a responsible and serious management in partnership with the city.

The transfer of technology by the operator is important to meet training targets for local professionals. It enables them to continue operating the systems efficiently and effectively and strengthens their professional skills considerably, thus strengthening the sector in Colombia.

Finally, a key factor in the company's success is the private partners' support (with LYSA and local shareholders holding 60 percent of the capital) of the company's management, which empowers the manager to resist pressures from local politicians.



2.4. Santa Marta

This section documents the case of the city of Santa Marta, as an atypical case of an early transformation into a private company, even before the creation of the National Public Services Law, which turned out to be an ineffective effort motivated more by clientelistic and corrupt interests than by service related motivations. As a consequence, the process ultimately led to engaging a specialized operator, beginning a real process of service improvement. The service conditions to date are not optimal for a departmental capital city with a high tourism potential that is not yet fully developed.

Until very recently, most residential public service companies in Colombia were characterized by inefficient operation which resulted in poor service to the community, and acted as a detriment to the economy. They offered no profits to the shareholders or credits to the beneficiaries. The inefficiency of these companies was favored by political negligence, clientelism and low labor productivity, thus generating an excessive indebtedness, poor service quality and a large number of legal problems such as attachments, lawsuits, and complaints.

The water supply and sanitation provider in Santa Marta was state-owned until 1972, when a mixed capital company⁷⁶, Acueductos y Alcantarillados de Santa Marta S.A. (ACUAMarta) was organized on October 9, 1972 through Public Deed No. 852 signed by the General Manager of the National Municipal Promo-

⁷⁶ Since the state owned over 90 percent of the shares, it was covered by the regime applicable to state-owned industrial and business companies.

tion Institute (*Instituto Nacional de Fomento Municipal, INSFOPAL*), the Governor of the Department of Magdalena, the Mayor of Santa Marta, the Municipal Representative and the Manager of *Empresa de Acueductos y Alcantarillado del Magdalena (ACUADELMA)*.⁷⁷

Five years later, in 1977, ACUAMarta changed its business name to *Empresa de Obras Sanitarias de Santa Marta S.A. (EMPOMarta)*.⁷⁸

In 1987, the National Government issued Decree 77, establishing that the supply of water supply and basic sanitation was the responsibility of each municipality, thus dissolving INSFOPAL, which had been carrying out that duty. Therefore, EMPOMarta was reformed again, with the mayor becoming its legal representative. Its life was defined in 20 years, through Public Deed No. 1350 of June 28, 1989.⁷⁹

Over the two years following the decree, EMPOMarta focused on seeking alternatives to comply with its purpose of providing water supply and sanitation services in Santa Marta. For that purpose, loans were obtained in an attempt to improve the technical conditions of the system by engaging advisors specialized in the construction of wells, pumping stations, optimization of treatment plants, water pressure improvement and design of a pipe system to take the water collected from the wells to the treatment plant. The anticipated outcomes, however, were not achieved with the investments carried out by EMPOMarta. These were: increasing the coverage and quality of water supply and sanitation services in the city, improving the billing, measurement and collection system, decontaminating water bodies, decreasing the losses in the networks and eliminating illegal connections.⁸⁰

Due to a critical financial and technical situation that prevented EMPOMarta from discharging its duties, the Mayor of Santa Marta issued Decree No. 207 on July 14, 1989, to establish a mixed economy company, with a 49 percent interest held by the District of Santa Marta and a 51 percent interest held by the private sector. Thus, in November 1989, *Compañía del Acueducto y Alcantarillado Metropolitano de Santa Marta S.A. E.S.P. (MetroAgua)* was organized and in December 1989 EMPOMarta was wound up. It should be noted that in October 1989, EMPOMarta had already granted the district the water supply and sanitation infrastructure under a trust to administer it on its own or through third parties through a lease agreement.⁸¹

77 Banco de la Republica (2000).

78 Through deed No. 1328 dated November 2, 1977, which amended the Public Deed dated 1972.

79 Banco de la Republica (2000).

80 Banco de la Republica (2000).

81 Established through Public Deed No. 1839 dated October 1989.

"Santa Marta was the first city in the country which, in a process of transformation and modernization of the water supply and sanitation services, incorporated private capital and experience."⁸² However, this transformation was not efficient originally, because Colombia lacked a regulatory framework for private sector participation in the provision of residential public services⁸³ and, furthermore, no specialized operator was available to improve it. On the contrary, it might be considered that it created an opportunity to foster corruption and clientelism since, although EMPOMarta was a municipal mixed-capital company, it was also a state-owned industrial and business company, whose legal representative was the Mayor.

Despite the organization of the mixed company – MetroAgua – the water and sanitation services in the city of Santa Marta continued being poor and the company's administrative and financial crisis persisted. Therefore, due to pressure exercised by the community, the Municipal Council and the National Government itself, a specialized operator was incorporated as a partner.

Thus, in 1997, MetroAgua entered into an agreement with the joint venture AGBAR Santa Marta, through a previous public bid, to operate the water supply and sanitation service in the city and develop environmental consulting. The joint venture was formed by *Aguas de Barcelona S.A. (AGBAR)*, *Interamericana de Aguas y Servicios S.A. E.S.P. (INASSA)*, *Eléctricas de Medellín Ltda.* and *Termotécnica Coindustrial Ltda.*⁸⁴

In July 2000, the joint venture AGBAR Santa Marta assigned its rights and obligations to the company AAA Servicios S.A. which, as the specialized technical partner, continued providing water and sanitation services in Santa Marta and, at the same time, became the majority shareholder of MetroAgua, as shown in Table 18. This was an internal transaction in the company, but originated the separation of a highly experienced operator, which became established as the specialized operator in the city of Cartagena with AAA Services becoming responsible for the cities of Barranquilla and Santa Marta. Finally, in 2001, a new specialized operating partner began operations in the District of Santa Marta, Canal de Isabel II, which by continuing to develop a more efficient and rigorous management, increased coverage and expanded the water and sanitation services in Santa Marta.

82 Banco de la Republica (2000).

83 Defined in Law 142 of 1994.

84 Banco de la Republica (2000).

Table 18. Capital stock composition of MetroAgua S.A. E.S.P. (year 2000)

Shareholder	Number of shares	%
District of Santa Marta	400,450	35
Local investors	252,111	22
Operating partner	505,130	43

Source: MetroAgua S.A. E.S.P.

2.4.1. Most Relevant Contractual Issues

MetroAgua was registered through Public Deed No. 1895 on November 14, 1989 in order to "improve the management indicators at the request of the Superintendence of Residential Public Services, increase the water supply, sanitation and micrometering coverage, install macrometers, increase the collection rate and decrease the rate of losses."⁸⁵

In 1999, the District of Santa Marta and MetroAgua signed a lease agreement for the water and sanitation systems of the city for a 20-year term, whereby at the end of each month the Company must pay to the Municipality of Santa Marta a lease fee of 33 percent of the value resulting from the deduction from the Company's gross collections of direct and indirect expenses.

2.4.2. Condition of the Infrastructure

Below is a description of the most significant changes introduced in the water supply distribution networks and wastewater collection systems and the resulting benefits since the international specialized operators (AGBAR and Canal de Isabel II) took over. To distinguish between the operations of AGBAR and Canal de Isabel II and to indicate the year in which the international non-specialized operator entered, a dotted line has been drawn in the charts below. Thus, AGBAR's operation is represented for the period 1998 – 2000, although operations began in 1997, until the time when the national operator became involved.⁸⁶ The operations of Canal de Isabel II are likewise represented in the charts beginning in 2001.

Before the participation of the qualified operators, the situation in Santa Marta was critical, as the Company did not have an effective Sanitation Master Plan and there were periodic events such as the constant overflow of sanitation pipes due to the inflow of rainwater (because of the lack of a rainwater collection

85 Banco de la Republica (2000).

86 No data are available for the national operator prior to 1997.

system) especially in the area of El Rodadero, a highly touristic area, with the inevitable economic and image problems for the city. In the rural area there was no sanitation system and water coverage was low. Additionally, the water was not suitable for consumption. Furthermore, some water bodies that were sources of supply were diminishing or had dried up.⁸⁷

The international operators made an important contribution to the basic sanitation system, expanding the sanitation coverage by 14 percent and treating the wastewater, as shown in Table 19.

Table 19. Evolution of the Sanitation Service Coverage in Santa Marta

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Number of sanitation Connections	35,200	44,840	48,862	49,991	51,092	53,092	57,020	58,663	59,400	61,061
Sanitation coverage (%)	59%	62%	65%	70%	70%	70%	73%	74%	73%	73%
Volume of wastewater treated ('000 of m ³)	-	12,266	12,765	13,148	13,409	13,175	12,834	12,490	12,349	11,617

Source: MetroAgua S.A. E.S.P.

Water quality and environmental management were the specialized operator's priorities. Therefore, since 2000 water treatment plants have been rebuilt and expanded and the first ocean outfall in Colombia⁸⁸, in order to mitigate the environmental impact generated by the discharge into the sea of untreated residential wastewater, a common practice in Santa Marta until April 2000.

Table 19 shows that during 1998 – 2000 water supply production increased by 4.7 million m³ to supply 6,841 new users (pink line). Since 2001 water supply production has decreased gradually, 6 million m³ over six years, despite having connected 12,262 new customers to the water network (pink line). However, water supply billing has remained stable during the presence of the international operators, at 15 million m³. This is due to a decreased need for repairs as networks have gradually been replaced where leaks have been detected. In the period from

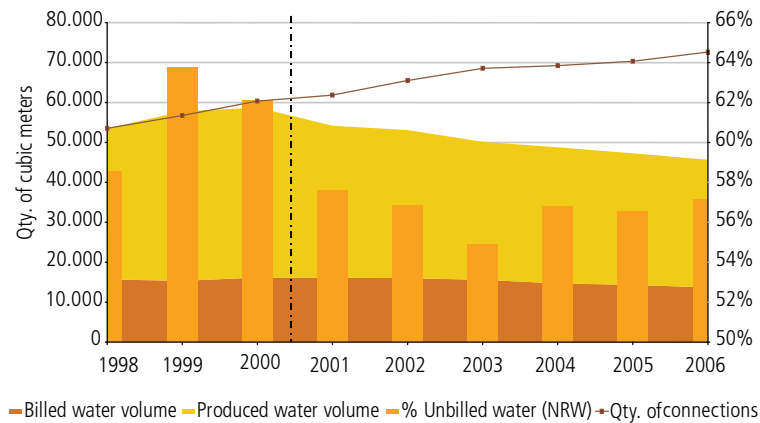
87 Banco de la Republica (2000).

88 Santa Marta was the pioneer of ocean outfalls in Colombia; the country's second outfall is being built in Cartagena de Indias. San Andrés Islas has already obtained the environmental licenses for the construction of an ocean outfall and recently (April 4, 2007) the company Pro-Activa Aguas del Archipiélago S.A. E.S.P. has been authorized to fell trees at the location where the construction of an ocean outfall is being planned.

1999 to 2005, the number of leaks repaired diminished by approximately 50 per cent (from 3,020 to 1,587) and in 2006 only 373 repairs were made.

The unaccounted for water index (Figure 23) increased considerably – five percent – during the international operator's first year. This is wholly due to reasons of public order in the country since at this time cases of rural population displacement to urban centers began being recorded. This led to the creation of substandard neighborhoods where squatters connected illegally to the public utilities networks. In 2001, the unaccounted for water index decreased by six percent, at a time when the government was seeking solutions to this social problem, facilitating centers to receive displaced families and thus avoiding such a large number of illegal connections. To date, this index has remained stable at approximately 57 percent, since the legalization of the connections in substandard neighborhoods is a slow and complex process due to the social issues involved.

Figure 23. Produced Water/Billed Water Ratio in the City of Santa Marta



Source: MetroAgua S.A. E.S.P.

The specialized operators' entry has contributed to improving and expanding the infrastructure required to properly provide water and sanitation services in the city of Santa Marta, as qualified by users and municipal authorities. The following section presents the most significant corroborating management indicators.

2.4.3. Service Characteristics

Different management indicators mark the performance in the provision of public utilities services, for example, service structure indicators such as coverage and micrometering which influence the produced and billed water volume, respectively.

Operation indicators – number of employees by connection, water produced by connection, broken and clogged systems – determine the management efficiency; therefore, leaks in the network and, consequently, the billed water volume, are controlled. Thus, quality indicators – service continuity, water quality, wastewater treatment – in combination with service structure and operation indicators, affect the economic indicators.⁸⁹ Table 20 shows the improvement trend in water supply and sanitation service management indicators in Santa Marta. The indicators presented are considered to be those most relevant to the specialized operators' management in MetroAgua.

Table 20. Management indicators of the water supply and sanitation service in Santa Marta

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Service Infrastructure									
Water supply coverage	0.74	0.76	0.85	0.85	0.87	0.88	0.88	0.86	0.87
Sanitation coverage	0.62	0.65	0.70	0.70	0.70	0.73	0.74	0.73	0.73
Micrometering coverage	0.36	0.37	0.39	0.49	0.56	0.59	0.62	0.65	0.65
Operation									
Number of employees per connection / 1000 connections	3.2	4.0	3.9	3.2	3.2	3.9	3.2	3.1	3.2
Network leaks (% unbilled water)	0.59	0.64	0.62	0.58	0.57	0.55	0.57	0.57	0.57
Quality									
Service continuity (No. hours/day)	12	14	14	16	18	19	20	21	22
Economic									
Total revenues (billions of pesos)	16.0	18.1	37.8	37.1	45.8	39.8	36.8	36.5	37.6
Net result (billions of pesos)	3.53	1.41	2.18	3.88	9.62	1.76	1.13	5.91	0.51
Operating expenses (millions of pesos)	3.08	3.15	3.76	4.71	5.56	6.93	4.72	4.28	2.51
Medium- and long-term debt (billions of pesos)	24.8	30.4	37.2	42.0	45.3	43.8	46.6	43.3	27.7

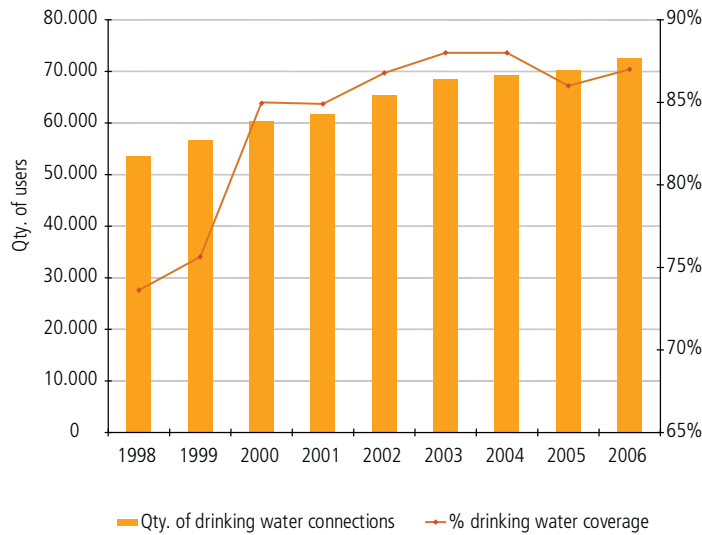
Source: MetroAgua S.A. E.S.P.

The increase in the coverage of both services – water supply and sanitation – is clearly noted in Figure 24 and Figure 25. The specialized operators' management

⁸⁹ Based on Aderasa (2007).

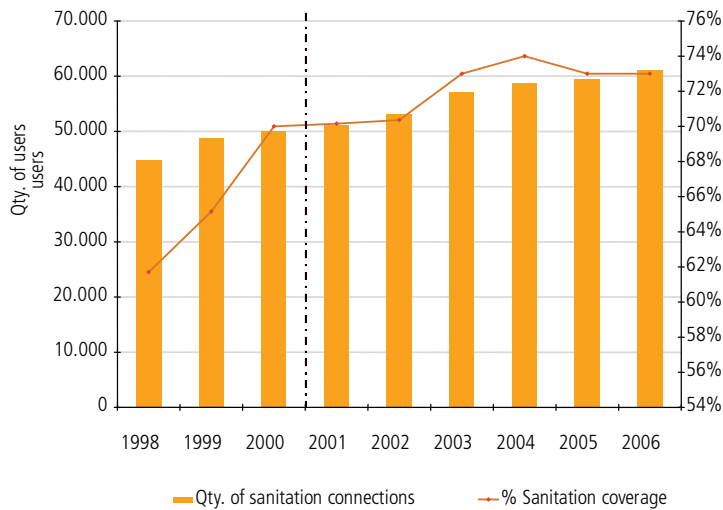
has allowed for a 13 percent increase in water supply coverage and an 11 percent increase in sanitation coverage, from 53,501 water supply connections in 1998 to 72,604 in 2006 and from 44,840 sanitation connections to 61,061 connections. In addition, the coverage of installed meters has almost doubled, from 36 percent in 1998 to 65 percent in 2006, as seen above in Table 20.

Figure 24. Evolution of Water Supply Coverage in Santa Marta



Source: MetroAgua S.A. E.S.P.

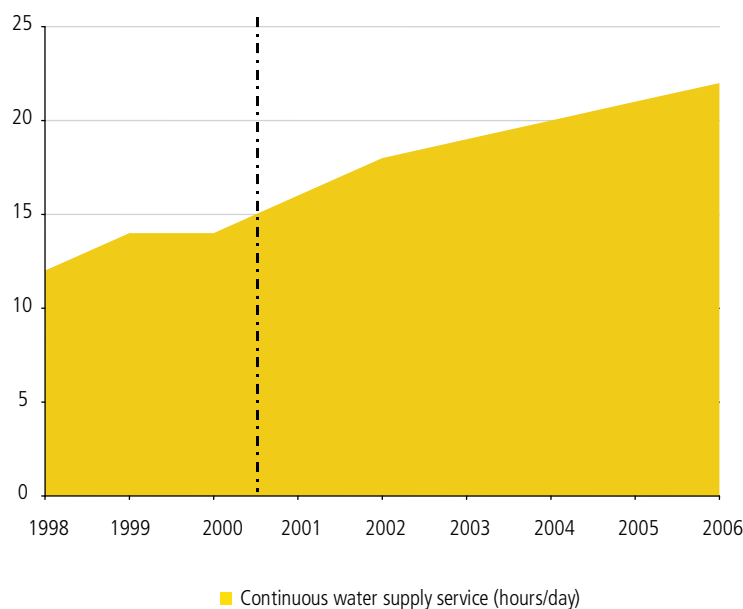
Figure 25. Evolution of Sanitation Coverage in Santa Marta



Source: MetroAgua S.A. E.S.P.

In 1998, the water supply service was only 12 continuous hours per day, while in 2006, the continuous water supply reached 22 hours per day, as shown in Figure 26. Water distribution has been improved since the specialized operators optimized the treatment plants and built deep wells and pumping stations.

Figure 26. Evolution of Sanitation Coverage in Santa Marta



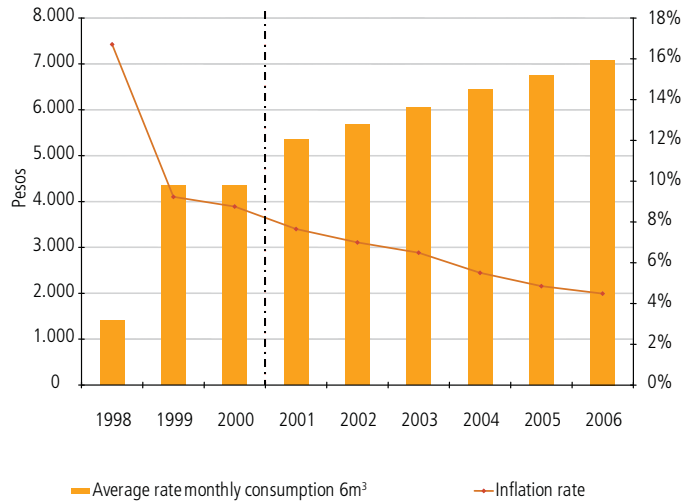
Source: MetroAgua S.A. E.S.P.

2.4.4. Evolution of Tariffs

The private participation scheme has shown that it is possible to expand the water supply and sanitation systems, improve the service and further increase the economic efficiency through thorough monitoring and control. However, to achieve these developments it is necessary to increase the revenues by increasing tariffs and requesting loans.

The operator AGBAR likely increased tariffs only in the second year of operations as a strategy to avoid giving rise to controversies at the beginning of its operations. However, in 1999 the tariff increase was very evident, as seen in a Figure 27. When Canal de Isabel II arrived as operator, there was another significant tariff increase (COP\$1,000), although the inflation rate continued to decrease.

Figure 27. Operator's Tariff Evolution: AGBAR (1998 – 2000) and Canal de Isabel II (2001 – 2006) in Santa Marta

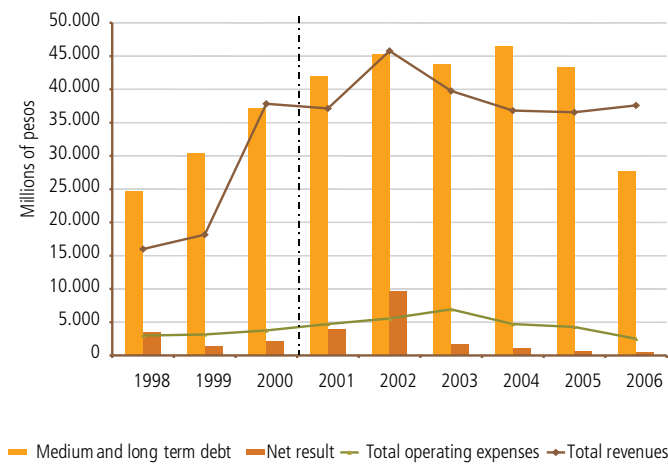


Source: MetroAgua S.A. E.S.P.

2.4.5. Financial Performance

As shown in Figure 28 MetroAgua's financial performance has been quite varied. It should be noted that there is a gap between the company's total revenues and total operating expenses. Also, since 2000 the level of indebtedness has been close to total revenues, aside from 2006, when the debt decreased significantly.

Figure 28. MetroAgua's Financial Performance in Santa Marta (1998-2006)



Source: MetroAgua S.A. E.S.P.

2.4.6. Lessons Learned

First, one of the reasons for the inefficiency of state-owned residential public service companies is their instability. For example, in only 17 years there were three companies providing water and sanitation services in Santa Marta which, in turn, were subject to the winding-up of their partners on two occasions. As a result of these problems, the incumbent politicians were more concerned with the legal and administrative processes than with the proper provision of the public service, their true corporate purpose. Ideally, the stability achieved since 2001 will favor compliance.

Secondly, the private participation scheme has shown that it is possible to expand the water supply and sanitation systems, improve service provision and further increase economic efficiency. This has been possible thanks to the involvement of a specialized operator that has experience in turning goals into achievements, while generating income.

Finally, the private sector participation in the provision of public services has benefited the poorest population, thus contributing to public health improvements as it is now more difficult for political interests to postpone investments in water supply and basic sanitation. This was the case before the enactment of Law 142 in 1994 as due to political convenience – "propaganda" – it was preferable to invest in areas where the infrastructure was very visible in evidence of the government's performance.



2.5. The Atlántico Department

This particular case analyzes the regional scheme adopted in the Atlántico Department, where the company Triple A de Barranquilla is leading the process. The study will focus on the impact that private intervention, i.e. operation and investment, has had on each of the service indicators, adding to the debate on the significance of PSP in the provision of water and sanitation services.

The case of Barranquilla points to the deterioration in the provision of residential public services, which began in the 1960s and worsened noticeably towards 1980. This phenomenon generated one of the most serious social and institutional crises the city has had to face, with serious clashes between society and the authorities, rampant corruption and an unusual increase in bureaucracy.

When comparing the current situation of public services to the previous scenario – so complex and critical as to be highlighted by the press and historians – the clear conclusion is that there have been great transformations in the city. Many of these transformations occurred because of the partnership of the private sector with the local and National Government, a great support to the city, which would have otherwise faced the possibility of collapse.

In 1991, through agreement No. 023 with the Municipal Council, the Municipal State Companies (*Empresas Públicas Municipales de Barranquilla*, EPMB) – until then responsible for the provision of the water and sanitation services – were finally turned into a Mixed Economy Company. *Sociedad de Acueducto, Alcantarillado y Aseo de Barranquilla S.A. E.S.P.*, or Triple A de Barranquilla S.A. E.S.P. (Water, Sewerage, and Cleaning Services Company of Barranquilla) was created

mainly with resources of the municipal state and with limited private investment of 15 percent of the new company.⁹⁰ The creation of this company implied a legal transformation of the old entity, but there was no partnership with private operators, and so the technical aspects were relegated to the background.

Within the framework of the above mentioned agreement, the municipality allocated the royalties from its shares in the company to the payment of EPMB's financial and retirement debts, and invested "in-kind", granting a 20-year concession to TRIPLE A for the use of the assets of the water and sanitation system.

Under these circumstances, TRIPLE A took over the operation of the Barranquilla system in the midst of a crisis of water quality, discontinuous service, a high percentage of the city having no service, high losses of treated water, continuous overflowing of sewers, gastroenteritis epidemics and the total absence of cleaning services.⁹¹

In 1996, when the technical and financial situation was still on the verge of collapse because of the insufficient revenues from the sale of services and municipal management resources assigned to the company, the municipality made the political decision of bringing in a specialized operator. After a bidding process, INASSA became a strategic partner of TRIPLE AAA. This improved the company's systems structurally and led to the implementation of an enduring management system.

Initially, this operator had an equity interest in Aguas de Barcelona (AGBAR), a Spanish company which was renowned in the world and which was operating in Latin America for the first time. Some years later, in 2001, AGBAR left this particular business and concentrated its operations in Cartagena, on the same Caribbean coast of Colombia. In 2002 it was replaced by Canal de Isabel II, another Spanish company, which operates the municipalities of the metropolitan area of Madrid. Despite the lack of data available for this study on the equity structure of INASSA, the impact of the specialized operator compared to the other partners, including the municipality, clearly shows that it has been very significant for the success of the scheme in Barranquilla.

Having consolidated the management of Barranquilla services, in 2000 TRIPLE A began its expansion stage into other municipalities of the Atlántico Department (see Table 21) which exhibited unsustainable conditions concerning water and sanitation investments and management based on their trends at that time.

90 According to restrictions in the Agreement.

91 Internal document of TRIPLE A of Barranquilla; "Quince Años De Compromiso Con Barranquilla"; 2007.

Thus, the company initially signed a 30-year agreement with Puerto Colombia in March 1997, through direct negotiation with the municipal authorities and with all the required political support. Likewise, in December 2001, with the support of the National Government, it took part in the bidding process for the Soledad municipality as sole bidder, signing a 20-year agreement. It also participated in the bidding process for the provision of services in the Galapa municipality, and was awarded the service in October 2002, for a period of 20 years.

Table 21. Population of the municipalities operated by TRIPLE A de Barranquilla

Municipalities Served	Population (2005)	Operator	Starting Date of Operator
Barranquilla	1,109,067	Triple A de Barranquilla S.A. E.S.P.	1997
Puerto Colombia	38,637	Triple A de Barranquilla S.A. E.S.P.	1997
Soledad	455,029	Triple A de Barranquilla S.A. E.S.P.	2001
Galapa	31,596	Triple A de Barranquilla S.A. E.S.P.	2002
Sabanagrande	24,880	AAA Atlántico S.A. E.S.P.	2004
Santo Tomas	23,188	AAA Atlántico S.A. E.S.P.	2004
Baranoa	50,261	AAA Atlántico S.A. E.S.P.	2004
Polo Nuevo	13,518	AAA Atlántico S.A. E.S.P.	2004
Sabanalarga	84,410	AAA Atlántico S.A. E.S.P.	2004
Usiacuri	8,561	AAA Atlántico S.A. E.S.P.	2007
Juan de Acosta	14,184	AAA Atlántico S.A. E.S.P.	2007
Tubará	10,602	AAA Atlántico S.A. E.S.P.	2007
Piojó	4,874	AAA Atlántico S.A. E.S.P.	2008
Total	1,572,953		

Source: TRIPLE A de Barranquilla S.A. E.S.P.

In 2004 and 2005, the results obtained in these municipalities generated a positive context to introduce TRIPLE A to the greater Atlántico region. Through an invitation by Atlántico's government and with the support of the National Government, a contract was signed with AAA Atlántico S.A. E.S.P. where TRIPLE A holds a majority interest and the role of specialized operator for "Operation with Investment" in the municipalities of Sabanalarga, Baranoa, Polonuevo, Santo Tomás, and Sabanagrande (in separate processes). The National Government invested over COP\$ 7 billion (equivalent to US\$ 3.4 million in 2007) in these municipalities, in addition to the commitments made by the Department (Regional Government) and the municipality.

Finally, by the end of 2006 and beginning of 2007, adjustments were negotiated in the contract for the operation of the Coastal Water Supply System, which includes the municipalities of Juan de Acosta, Usiacuri, Tubará, and Piojó, where the company began implementation in 2007 and 2008. Thus, TRIPLE A is now associated with 13 municipalities in Atlántico, providing service to over a million and a half inhabitants, who according to the available surveys and opinions have given the company their full support.

Table 22. Equity structure of AAA Atlántico S.A. E.S.P.

Shareholder	Participation %
Triple A de B/q S.A. E.S.P.	94.9%
Fontriplea	0.08%
Gis Ltda.	1.58%
Inassa S.A	3.44%
R & T	0.0000381%

Source: TRIPLE A de Barranquilla S.A. E.S.P

2.5.1. Most Relevant Contractual Aspects

As previously mentioned, Colombia addressed the modernization of the scheme of residential public services provision in the 1990s, when the 1991 Constitution opened the way for service provision by private agents. This opening process was later reflected in Law 142 of 1994, which completely redefined the institutional scheme and the arrangements for the provision of residential public services in Colombia.⁹²

The process of transformation of the Municipal State Companies of Barranquilla, and afterwards of TRIPLE A, began within this framework. It represented one of the first initiatives to bring about reform in the country, the so-called "first generation" processes.⁹³

TRIPLE A's activities within this new context began once the company was set up through a Subscription of Shares Agreement where the new shareholders took ownership and operational control, with the Barranquilla municipality remaining a non-executive partner throughout a 20-year concession agreement. The main responsibilities included in the concession related to management of resources in infrastructure works and targets for improved service quality in the city of Barranquilla.

92 Andesco (2005).

93 Burgos Mejia (2005).

The investments to be made by the company as concessionaire for the process of rehabilitation, construction and service improvement are not defined in the agreement in terms of amounts or execution terms. This provides flexibility in the definition of the investments to be carried out, since these are executed according to the company's revenues and its financial possibilities.⁹⁴

The agreements for Puerto Colombia, Galapa, and Soledad, on the other hand, do not include any operator's commitment for investment in the municipalities, except for the resources generated in the operation of the systems itself or contributions from the Department or the National Government.

In the smaller municipalities, which are being operated and managed by AAA Atlántico under the above stated conditions, there are three similar "operation with investment" type agreements. These are typical operation agreements, with the difference being that the contractor is responsible for "developing the final designs, financing and carrying out infrastructure replacement and expansion works for the water and sanitation systems."⁹⁵

The operation, an investment agreement signed between ASISER S.A. E.S.P. – an existing association of the municipalities of Baranoa and Polonuevo, as well as the contracting entity – and AAA Atlántico is the assignment of an agreement originally executed with Sociedad de Aguas del Norte S.A. E.S.P. through a direct negotiation. The other agreements are similar to this one in the scope of their main components, but were awarded through other processes.

Table 23 includes a description of the obligations of the operator and the contracting entity, in the three agreements signed up to 2007.

94 BANKWATCH RATINGS DE COLOMBIA S.A. Supporting documents for bond issue, 1997.

95 Investment with operation Agreement No 1 of 2003 by and between ASISER E.S.P. and Sociedad Aguas del Norte S.A. E.S.P.

Table 23. Operator and Contracting Entity's Main Contractual Obligations

Operator's Main Contractual Obligations	Contracting Entity's Main Contractual Obligations
<ul style="list-style-type: none"> • Meeting coverage and service quality targets. • Paying the part of paid-in capital (COP\$ 1 billion – 2001). • Obtaining the necessary financing to perform the contract. • Submitting an Annual Plan of Works and Investments, a Five Year Plan and the corresponding Environmental Management Plan. • Guaranteeing at its own risk the efficient, continuous and regular provision of residential water and sanitation public services, as well as their coverage and quality, operating capacity and infrastructure conditions. • Developing the definitive designs, financing and executing the infrastructure replacement and expansion works for the water and sanitation systems. • Timely payment for contract supervision. • Within eight months of starting its activities, the operator should develop, together with the municipalities involved, the legal process that will make it possible to democratize the company, under the terms established in the agreement (up to 10 percent of AAA Atlántico S.A. E.S.P.'s total shares). • Paying COP\$ 300 million (2001) as a contribution towards the social security liabilities of ASISER ESP. 	<ul style="list-style-type: none"> • Authorizing operator to use assets related to Water and Sanitation System Service. • Respecting the tariff structure that the operator shall adopt as a result of the agreement under penalty of breach of contract in favor of the operator. • Transferring all the licenses. • Guaranteeing the availability of the land for the provision of the services through Public Utility Declarations. • Supervising the performance of the Operation with Investment agreement • Carrying out the necessary proceedings to provide subsidies for those users entitled to them. • Assuming and taking responsibility for all the labor obligations with the workers generated prior to the operation with investment agreement.

Source: TRIPLE A de Barranquilla S.A. E.S.P

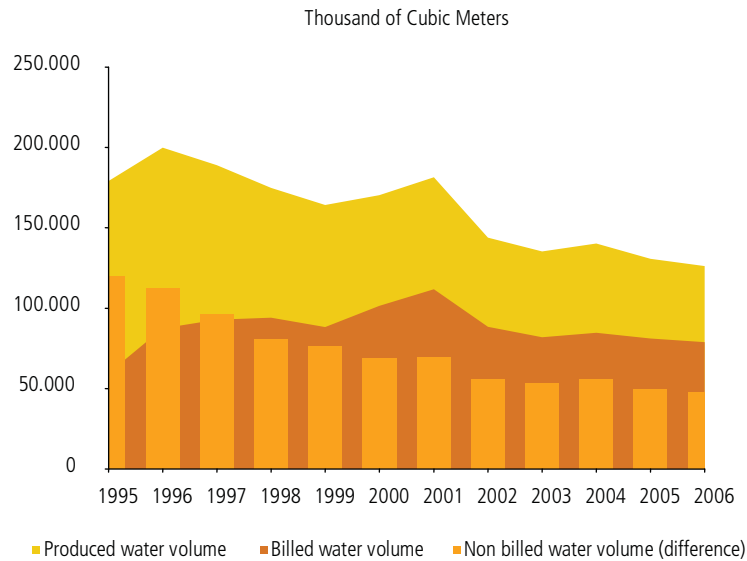
2.5.2. Condition of the Infrastructure

Since several municipalities have TRIPLE A as a private partner and operator, the following description of the systems and benefits (impact) resulting from the company's entry has been divided into two groups, based on how long they have had the operator and on their size. The result is a first group including Barranquilla, Puerto Colombia, Soledad, and Galapa; and a second group with the smaller municipalities, which have had three years or fewer of operation.

As mentioned in the previous section, the infrastructure of the water and sanitation systems of Barranquilla was in a poor condition due to deterioration it had suffered during the 1980s and before. A large part of the population had access to water for only two to four hours a day, two or three times a week. Others had to carry water in containers or in carts pulled by animals over considerable distances. Moreover, the quality of this water was not optimal, and so there were gastrointestinal diseases, mainly in children, increasing children morbidity, mortality rates and adding to the conflicts generated by the difficult access to water.

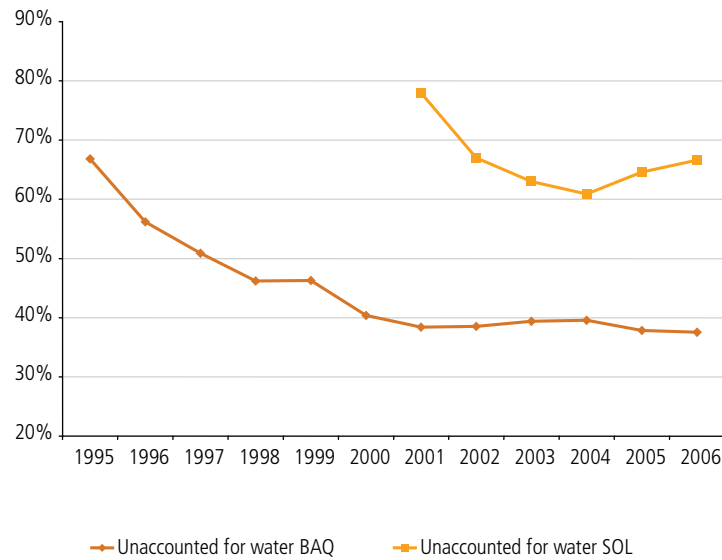
Figure 29 clearly shows the decline in the volume of non-billed water (bars) with the arrival of TRIPLE A to Barranquilla (dotted line). Even so, Figure 30 shows the gradual drop of the unaccounted for water index for Barranquilla and Soledad, starting from very high values: close to 70 percent for the first and 80 percent for the second.

Figure 29. Produced and Billed Water Ratio in the City of Barranquilla



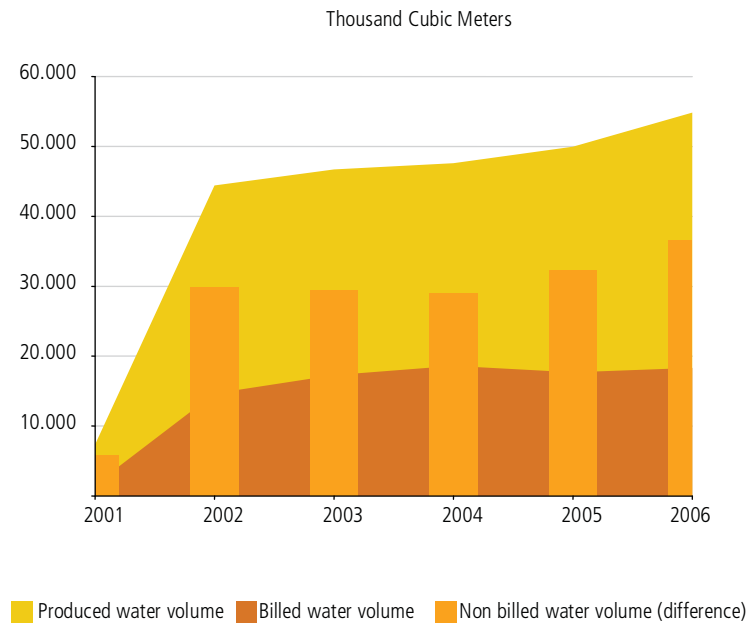
Source: TRIPLE A de Barranquilla S.A. E.S.P

Figure 30. Percentage of Unrecorded Water for Barranquilla and Soledad



Source: TRIPLE A de Barranquilla S.A. E.S.P.

Figure 31. Produced and Billed Water Ratio in Soledad



Source: TRIPLE A de Barranquilla S.A. E.S.P.

Figure 31 depicts the striking change as a result of the arrival of the operator (dotted line) at the end of the first year of operations in the municipality of Soledad, with no substantial investments but with specific measures taken by the specialized operator in similar cases. This also reflects the extremely poor conditions of the conveyance and distribution infrastructure, which generated significant losses of water and insufficient supply for the population.

As mentioned in previous cases, water losses are associated with countless variables which makes it a strategic indicator for management control. It shows the degree of vulnerability of the system (broken parts, age), management efficiency (early detection of leaks, efficiency in washing operations), and users' maturity level (no fraud in answer to the operator's good service and pressure), among others.

TRIPLE A has been operating the water and sanitation systems of the Puerto Colombia and Galapa municipalities since 1997 and 2002, respectively. These were the first two municipalities of Atlántico that held a bidding process and which, due to their closeness to Barranquilla, have received a "neighborhood treatment" within the operational, technical and commercial areas of the operator. The benefits obtained from economies of scale in service provision are evident in these cases, as in Soledad.

The results in terms of infrastructure management have been satisfactory for the local authorities and for the community itself, according to available surveys.⁹⁶ They have perceived a significant improvement in the service, apart from the good image generated by the operator through physical changes in the treatment plants and the administration buildings, generating a better living environment for the community.

The situation in the municipalities of Baranoa and Polonuevo, Sabanagrande and Santo Tomás, and Sabanalarga did not improve as much and had systems that were in an even worse condition than in Barranquilla or some other larger municipalities.

The main problem encountered by the operator from the bidding stage was the little information on the state and main characteristics of the system components, such as treatment plants, water and sewer pipes, collectors and interceptors, among others. This generated economic risks for the operator at the time of submitting an offer, as well as contingencies for the municipality due to the lack of information.

In 1999 the Sabanagrande and Santo Tomás municipalities formed a regional water system operated by ASOSASA – an association of both municipalities – which shared the capture and adduction components, treatment plants, raw and treated water stations and management of the treatment plant. The water system had "leaks, illegal connections and irrational consumption on the part of the users, which made

96 Surveys.

it difficult to manage."⁹⁷ Furthermore, the sanitation system had approximately 60 percent coverage, with problems of sewage discharge in public thoroughfares and the consequent health problems for the population. The households that are not served by this system have latrines and septic tanks. Loss management became difficult because of the absence of section valves and the lack of network cadastres (information on length, diameter and type of material).⁹⁸

The system in Baranoa and Polo Nuevo was in similar condition and had even greater difficulties concerning resources. Therefore, "ASISER's revenues and portfolio make it impossible to repair even the minimum damages in the system and the debt to take care of the payroll, chemicals, electric power, etc. continues to mount day after day; while users stop paying because of the poor service conditions.

These municipalities provided untreated water from wells because of deficiencies in the treatment plants of surface water (River Magdalena) intended to cover the total demand of the two municipalities. Besides, the plants operated an average of only five days a month because there were no administrative agreements between the municipalities on the amount of water corresponding to each, for which reason they did not contribute the resources for the purchase of chemicals.

The total absence of sanitation systems led people to build septic tanks and latrines with no technical knowledge, affecting the health conditions of the municipalities.

As set forth in this section, the overall situation of the water and sanitation systems of all the municipalities had serious deficiencies making them impossible to manage as required by Colombian law, particularly with reference to water quality, service continuity and wastewater disposal, among other issues.

The solution to these problems required large investments that could not be financed through tariffs because of the population's economic situation. The National and Departmental Governments intervened with contributions for each of these processes. These resources were directly allocated to infrastructure upgrading, managed by a trust fund and executed by AAA Atlántico S.A. E.S.P. The total investments made by the operator for this purpose, as reported by the company, was COP\$ 9.6 billion from its own resources (through tariffs), COP\$ 7.15 billion in contributions made by the Nation through the Ministry of Environment, Housing and Territorial Development, and COP\$ 4.27 billion in contributions from the Atlántico Department (in 2007 currency).

97 Hidrotec (1999).

98 Hidrotec (1999).

2.5.3. Service Characteristics

As can be seen in Table 24, there has been a clear trend towards improvement in each one of the most relevant indicators of the service in the cities and towns analyzed.

Table 24. Most relevant indicators associated with service quality for the three municipalities (Barranquilla, Soledad, and Baranoa/Polo Nuevo)

	Quality: % conforming samples			Continuity: % population with intermittent service			Repaired leaks
	BAQ	SOL	BAR/POL	BAQ	SOL	BAR/POL	BAQ
1995							12.974
1996							24.589
1997	100,0%			29,6%			21.841
1998	100,0%			25,2%			19.205
1999	99,9%			21,8%			20.117
2000	99,0%			16,5%			21.116
2001	100,0%			8,7%			20.580
2002	100,0%			5,8%	27,0%		16.242
2003	99,0%	98,8%		0,0%	17,0%		16.838
2004	99,8%	98,9%		0,0%	17,0%	100%	14.237
2005	99,9%	99,8%	90%	0,0%	16,9%	100%	14.212
2006	99,5%	99,3%	98%	0,0%	0,0%	100%	

Source: TRIPLE A de Barranquilla S.A. E.S.P.

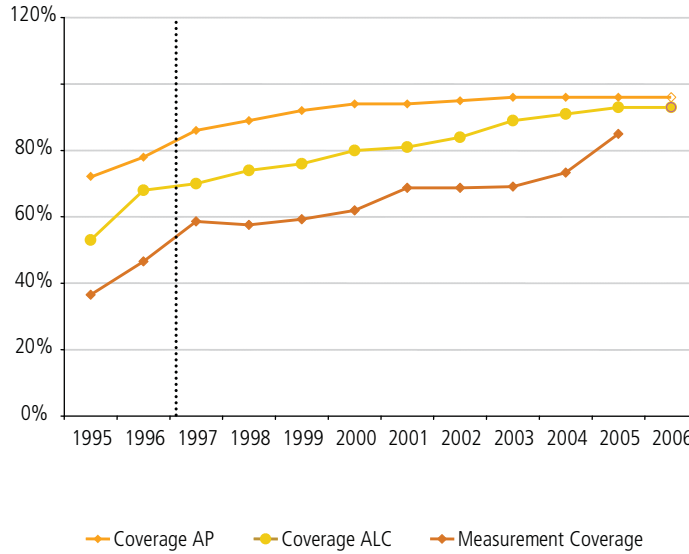
One of the greatest achievements in a private participation scheme is increased coverage. It not only reflects an increase in customers for the operator, but also a major social benefit in terms of access to water supply and to a better quality of life, significantly reducing the risks of gastrointestinal diseases, among many other benefits.

It is evident that an important lag has been overcome in the municipalities that are the object of this study. This implies management capacity and significant economic investments, and a lot of time. In fifteen years of management, Barranquilla has been able to reach optimum levels of 99-100 percent coverage, starting from 70 percent in 1993; and a 25 percent increase in the municipality of Soledad, from 69 percent to 84 percent as seen in Figure 32 and Figure 33.

Baranoa and Polo Nuevo, representing the other municipalities in the region, have evolved from 62 to 69 percent with the change of operator, i.e. with

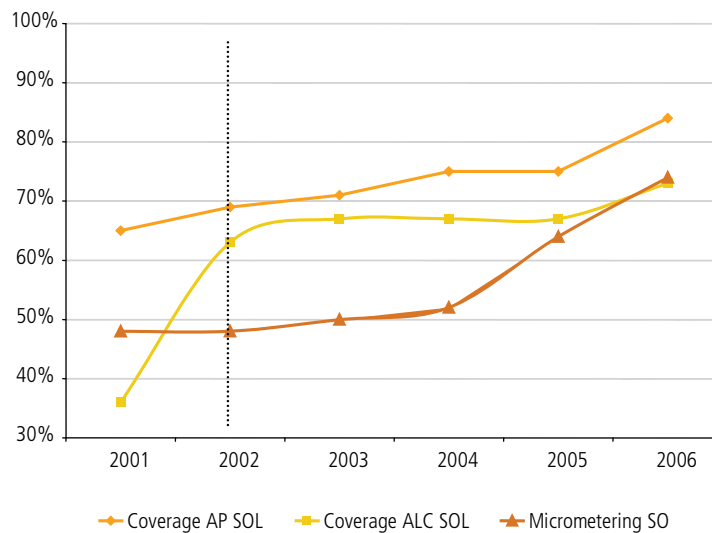
the arrival of AAA Atlántico S.A. E.S.P. This means that in less than three years approximately 10,000 people gained access to a service they previously lacked.

Figure 32. Evolution of Service Coverage in Barranquilla



Source: TRIPLE A de Barranquilla S.A. E.S.P.

Figure 33. Evolution of Service Coverage in Soledad

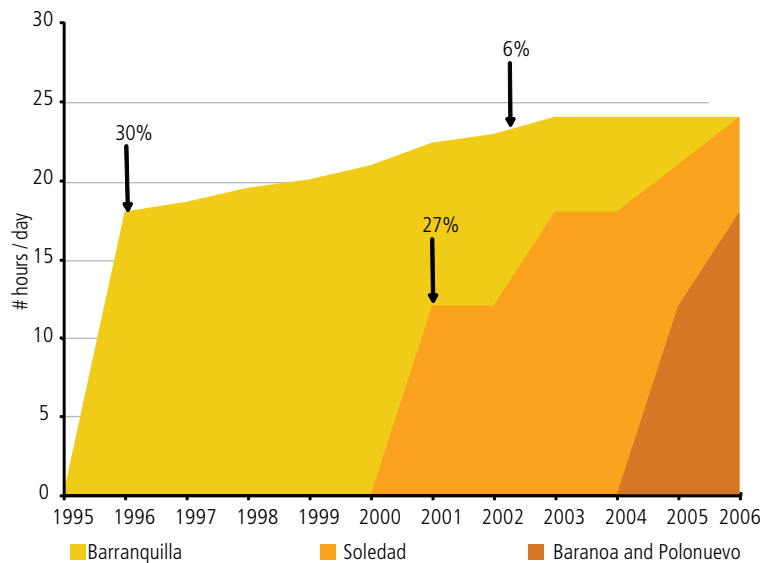


Source: TRIPLE A de Barranquilla S.A. E.S.P.

Taking into account the fact that the expanded coverage of a water and sanitation system is not merely the installation of the network, but the effective and continuous provision of water supply or collection of sewage, there is a clear relationship between these two coverage elements and the continuity of the service.

Barranquilla enjoyed the benefits of increased water continuity, from 19 hours of service for 30 percent of the population, to 24 hours of service in 100 percent of the city in seven years. In Soledad it took the operator five years to achieve full water coverage of the population for 24 hours. Before the arrival of private sector involvement, there were only 12 hours of service for 40 percent of the population.

Figure 34. Evolution of Continuity of Service (hours/day) in Barranquilla, Soledad and Baranoa / Polonuevo



Source: TRIPLE A de Barranquilla S.A. E.S.P.

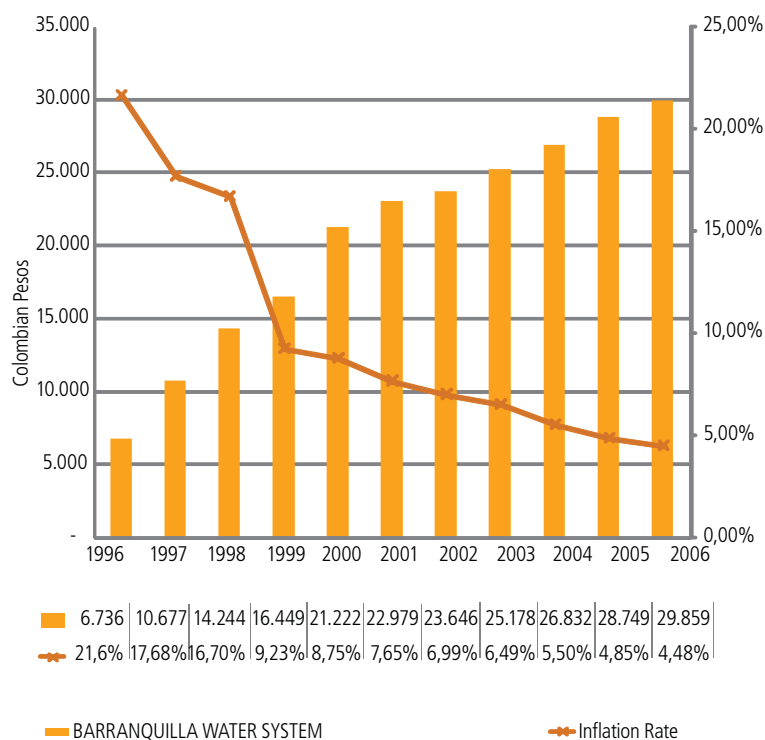
2.5.4. Evolution of Tariffs

The tariff increases in Barranquilla and the Atlántico municipalities resulted from the methodologies authorized by the Water and Sanitation Regulatory Commission. Nevertheless, there were tariff lags that required constant increases, apart from the country's inflation, which over the first years of operation exceeded 15

percent year on year.⁹⁹ Thanks to the evident improvement in service quality, especially in light of the situation at the time of arrival of the operator, the increases have not been met with insurmountable resistance in the community.

Figure 25 shows data on the water tariffs, presenting an average bill (fixed charge plus 20 m³ of monthly consumption, called basic consumption) for stratum 4 in Barranquilla.

Figure 35. Tariff Evolution of Stratum 4 Average Water Bill in Barranquilla



Source: TRIPLE A de Barranquilla S.A. E.S.P.

2.5.5. Financial Performance

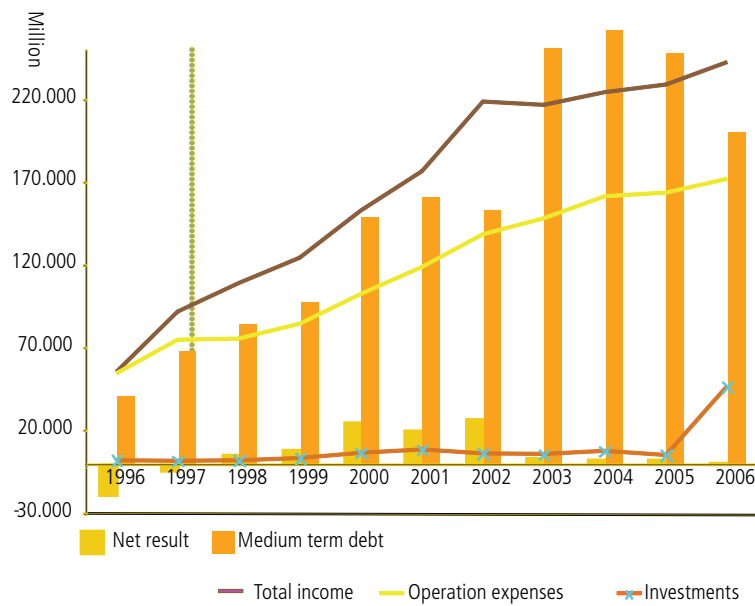
Figure 36 shows the consolidated financial performance for the two operators: TRIPLE A de Barranquilla S.A. E.S.P. and AAA Atlántico S.A. E.S.P. The operation began paying dividends two years after the arrival of the operator, reflecting the benefits

⁹⁹ In the CRA methodology previous to Resolution 151 and 287, the tariff increase considered was from month to month. The new regulation considers tariff increases each time inflation reaches a certain value. This generates more stability in the perception of the public and in the practical aspects for the companies.

of the agreement without investment. In 2003, the Company began the major investments in the system that was required in order to extend the coverage, based on credit and with the company being capitalized by its private shareholders.

From the first year, the operating expenses were covered by the revenues as a result of specific user management actions and by optimizing the system's operations.

Figure 36. Financial Performance 1996-2006, Triple A de Barranquilla (includes results of AAA Atlántico).



Source: TRIPLE A de Barranquilla S.A. E.S.P.

2.5.6. Lessons Learned

One of the facts that should be underlined in this analysis is that TRIPLE A, as a private company, has completely separated the state from its functioning and policy decisions, both because of legal aspects and as a consequence of the drive of the company as manager of the upgraded water and sanitation public services in Barranquilla. Having addressed this process in a responsible way with the city, it generated trust with the authorities. This does not mean that the district as a shareholder does not participate in the most important business decisions, safeguard the wellbeing of the communities served, or supervise the city's interests,

but rather that it has moved away from the business decisions, the company's organization and functioning, in order to avoid repeating the city's previous crisis.

The key factors in the development of a regional process like the one being carried out in the Atlántico Department by Triple A de Barranquilla are: the economies of scale that make it possible to maintain low operating costs; the results derived from prioritized and effective investments in socially vulnerable sectors; and an aggressive and continuous image management in the communities of beneficiaries.

Based on the experience of Triple A de Barranquilla it can be concluded that PSP should go beyond obtaining higher financial contributions from local or foreign investors (with purely financial and commercial interests) and should incorporate external agents that specialize in the provision of public services. Only in this way is it possible to have the technical, operational and commercial support required to focus on the most strategic aspects of the system with greater priority.

The active participation of corporate officials from the specialized operator – i.e. Aguas de Barcelona for the period 1997-2000 and Canal de Isabel II for the period 2001-2007 – is a necessary watchdog for TRIPLE A's management, and a mechanism to convey best practices from these two international companies.



2.6. Aguas de Manizales S.A. E.S.P.

The case study presented here analyzes the management and operation of Aguas de Manizales S.A. E.S.P. It focuses on the company's success because of excellent public management at a political, operational and technical level, without the participation of any specialized operator.

2.6.1. The Reform Process: Optimizing Good Management

Before 1996, the state owned companies of Manizales, characterized by good management, provided water and sanitation, street cleaning, and telephone services. Nonetheless, seeing how most public services in the country provided by state monopolies had low levels of efficiency, quality and opportunity, it was feared that the same might happen in the city, considering the political uncertainty associated with the public nature of the company.

Driven by this review of the traditional models fostered by the National Government, and seeking a higher autonomy and efficiency for its management, the Municipal Council through Agreement 164 of August 24 of 1994, bestowed on the Mayor powers to transform the state companies in terms of their structure, equity and management style. On February 28, 1996, Aguas de Manizales S.A. E.S.P. was created under Public Deed No. 521, as a mixed economy company for the provision of residential water and sanitation services, conservation of water basins and other supplementary activities, with the equity structure outlined in Table 25.

Table 25. Aguas de Manizales S.A. E.S.P. Equity Structure

Entity	Number of Shares	Shareholding Interest (%)
INFI-Manizales	36,485,226	99.9753
Municipality of Manizales	121	0.0003
INVAMA	244	0.0007
Caja de la Vivienda	121	0.0003
EMAS	8,536	0.0234
Total	36,494,248	100

Source: Aguas de Manizales S.A. E.S.P.

In Aguas de Manizales S.A. E.S.P., private participation represents just 0.0234 percent, owned by *Empresa Metropolitana de Aseo* (EMAS), which acted as facilitator since said participation did not translate into any real power in the management of the company but was useful in modifying its nature.

The company's new structure, equity shareholding, legal framework and management have generated results that are responsible for its progress in the operation of the city services and show the wisdom of transforming it. Part of the success was due to the inclusion of renowned city leaders in the Board of Directors, thus providing a more business-oriented management, focused on increased competitiveness, which was reflected in the expansion of the Company to other regions in the country.

Under the agreement, Aguas de Manizales S.A. E.S.P., apart from having to meet the obligations presented in Table 26, has to pay royalties for an amount equal to ten percent of the billings. This payment will be assigned mainly to legalizing assets and rights of way, as well as to the purchase of land and reforestation for basin protection.

In this way the Río Blanco, Chinchina and Guacaica river basin protection areas will be extended. These areas were initially created at the beginning of the 20th century thanks to the visionary awareness of the municipal administrations and the local civic leadership. Since the beginning of the concession agreement, 400 hectares have been bought in the Rio Blanco basin, for a total of 3,617 hectares, the conservation of which is the responsibility of Aguas de Manizales S.A. E.S.P. The owner of the land, however, is the main shareholder: INFI-Manizales, an entity created in 1999 for the city's financing, promotion and integral development. In addition, in the Chinchina river basin, the conservation of 15,000 hectares of natural forest is included in the Procuencia project.

This project was the first one of its type in Colombia for CO2 capture and was recently approved by the Ministry of Environment, Housing and Territorial Development. This has generated the possibility of additional funding from the sale of CREs (emission reduction certificates) in international markets, with clear additional environmental benefits like the regulation of flow rates to supply water to the City of Manizales. Furthermore, Procuencia has been promoting the reforestation of private lands with commercial use in the central part of the basin, with over 4,000 hectares planted between 2002 and 2006.

Table 26. Obligations Arising from the Concession Agreement

Main Contractual Obligations for the Concessionaire	Contractual Obligations for the Grantor (Manizales State Owned Companies)	Contractual Obligations for the Municipality
<ul style="list-style-type: none"> • Guaranteeing the provision of water fit for human consumption, according to the existing regulations, 24 hours a day, 365 days a year, except for temporary interruptions for maintenance, replacement or prevention of disasters, and with a minimum pressure of 20 lbs/sq. inch • Providing water service to the entire urban population located below the level of the treatment plants, as well as to the previously served rural population, with the obligation of expanding coverage in this sector. • Implementing a geographical information system to keep the cadastre of infrastructure and user register updated, in order to facilitate the future operation of the system by people other than the concessionaire • Maintaining 100 percent micrometering coverage in urban and rural areas • Operating, maintaining, repairing and extending the water and sanitation networks • Continuing with the studies and the execution of the project for water cleaning, intended to achieve compliance with the existing regulations on the disposal of liquid waste • Keeping the citizens informed on tariffs and quality of services provided • Informing the Municipality, and other entities in charge of public works in the city, of its work plan for mutual coordination 	<ul style="list-style-type: none"> • Transferring all the water and sanitation service assets as well as service provision • Collaborating with the concessionaire in all issues or problems arising from events which occurred when the grantor was the service provider • Covering economic charges assumed by the Concessionaire that do not correspond to the facilities used for services or service provision, provided that such charges relate to assets transferred by the Grantor or that were under the Grantor's responsibility 	<ul style="list-style-type: none"> • Safeguarding and protecting the water sources that supply the treatment plants used by the Concessionaire • Coordinating with the concessionaire the inclusion of its projects in the Land Use and Development Plans • Requiring a certificate from Aguas de Manizales on whether or not non-residential wastewaters need to be treated before granting licenses • Covering the cost of water consumed in recreational fountains, public bathrooms and fountains installed for the free use of citizens • Promoting agreements between the Concessionaire and the other utilities for the execution of works in a coordinated manner, seeking to reduce costs and inconveniences for the citizens

Source: Aguas de Manizales S.A. E.S.P.

Aguas de Manizales received the recognition of the National Government, after ten years of consolidating its service management, when it was presented to the Departmental Governments of Cesar and Magdalena as a specialized operator with the experience and the capacity required to develop their Departmental Water Plans.

Thus, on September 20, 2006, Aguas de Manizales S.A. E.S.P., signed an Agreement with the Departmental Government of Cesar to manage and supervise the Departmental Program for the Structural Transformation of Water and Basic Sanitation Services, for COP\$12,459 million (approximately US\$ 5,139,544 in 2006) for three years.

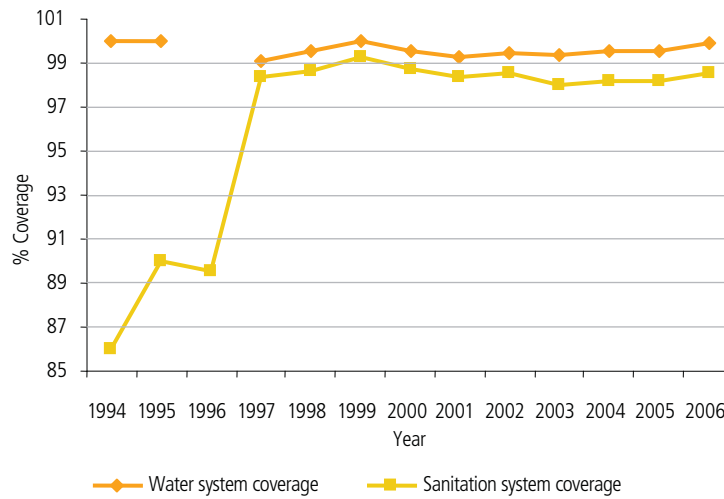
Likewise, in December 2006, the Departmental Government of Magdalena signed an agreement with Aguas de Manizales S.A. E.S.P. for the Technical Management and Supervision of the Water and Sanitation Plan in said Department, for COP\$24,783 million (approximately US\$ 10,223,398 in 2006) over five years.

Thus, the company is expanding its area of operation to zones with traditional deficiencies in the provision of public services. This entails a major challenge of knowledge transfer, and will allow the company to obtain significant profits in addition to those expected through tariffs, as well as to acquire essential experience for the opening of new markets.

2.6.2. Condition of the Infrastructure

As stated earlier, in the city of Manizales the provision of services by state-owned companies was adequate overall, although there were aspects to be improved that represented challenges for the companies taking over. Concerning water and sanitation coverage, at the time of the reform there was a significant difference between the two. While water coverage was in excess of 99 percent, sanitation coverage was 86 percent, as shown in Figure 37.

Figure 37. Evolution of Water and Sanitation Coverage

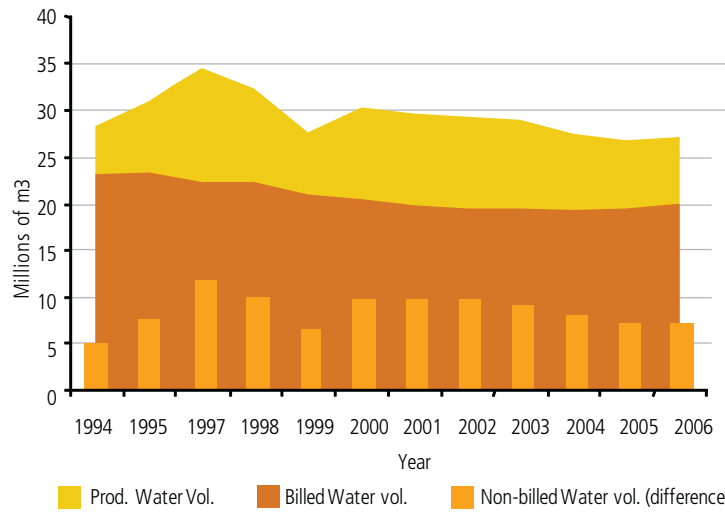


Source: Aguas de Manizales S.A. E.S.P.

The reform had a considerable impact on sanitation coverage, as a result of significant investments between 1996 and 1997, when it increased from 89.5 to 98.3 percent. Data for 1996 is missing and it corresponds to the transition period from one company to the other, which caused part of the information loss.

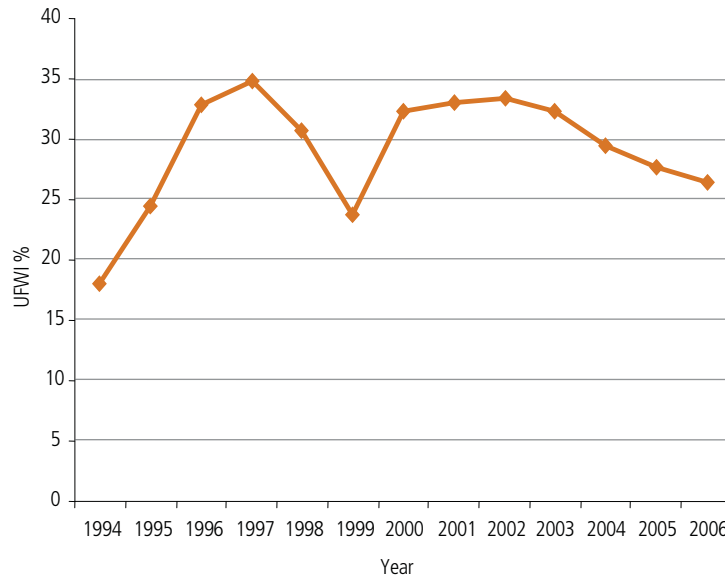
The reliability of the measurement of non-billed water volume has been a very controversial issue and Aguas de Manizales S.A. E.S.P. was no exception. The evolution of the volumes of produced and billed water is presented below in Figure 38, including the difference between them.

Figure 38. Difference between Produced and Billed Water Volumes



Source: Aguas de Manizales S.A. E.S.P.

Figure 39. Variation of Unaccounted for Water Index



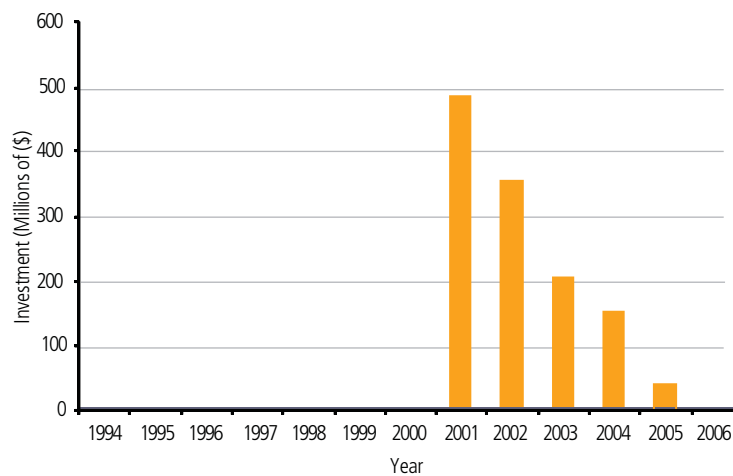
Source: Aguas de Manizales S.A. E.S.P.

In the first years, there is an irregular variation in non-billed water volumes, like those corresponding to the two years of management by state-owned companies, when the unaccounted for water index was 18 and 24 percent, below national and international standards. Moreover, there is an increase of the Index with the entry of the Concessionaire because of better macrometering and the use of new calculation methodologies, which produced a more accurate value. In 1999, it diminished to close to 24 percent and after 2000, more logical values are observed, ranging between 33 and 26.5 percent.

Another notable aspect is the clear reduction trend in the annual volume of produced and billed water. This could be the result of increased efficiency in the use of resources, both by the company in the treatment plants, and by the users in response to tariff increases.

Figure 40 provides a possible explanation for the decrease in losses previously observed, although not a total match. For example, although the largest investments were made in 2001, the unaccounted for water index increased slightly in 2002. There were large investments in 2001 and 2002, corresponding to valve automation, instrumentation and network inspection points (NIP), macrometering, telemetry, remote control and tank automation. In 2003 and 2004, investments were limited to instrumentation and NIP points, while in 2005 only a macro-meter and a tank level meter were installed. This progressive decrease reached zero in 2006, based on the achievement of very complete equipment, as well as very low losses, which imply the execution of large investments.

Figure 40. Investments in Loss Control



The evolution of the daily non-billed water volume, as a function of the water network length and the number of connections, showed the behavior illustrated in Figures 41 and 42 starting in 2000, when information first became available.

Figure 41. Evolution of Losses/Network Km.

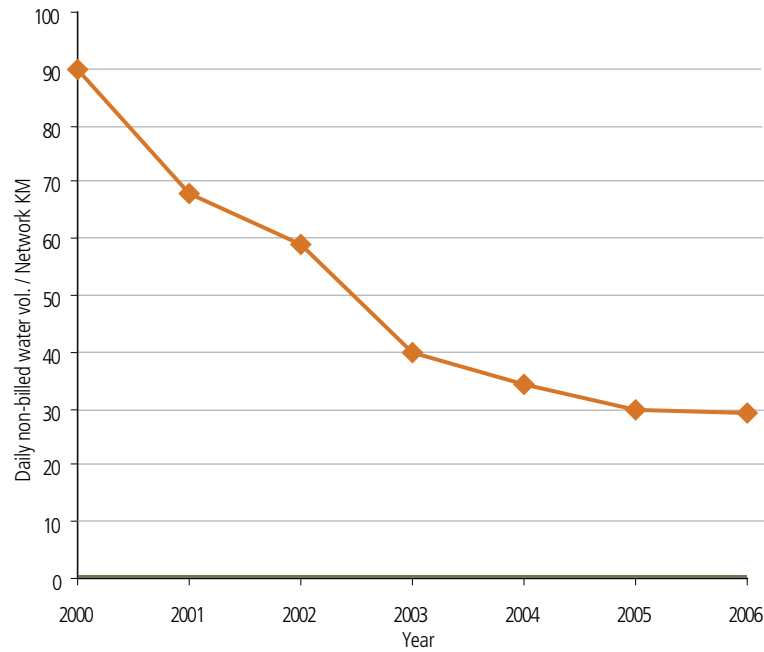
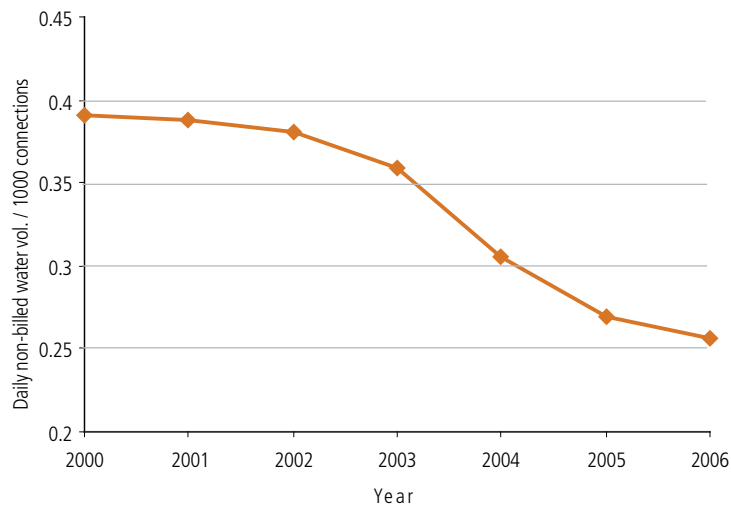


Figure 42. Evolution of Losses/1000 Connections



Once more, a decrease in losses proportional to the investments carried out becomes evident. In the last years, the trend is towards stabilization as a consequence of the decrease in the amounts invested.

2.6.3. Service Quality

Since 1994 the service quality has been excellent throughout the operating period of Aguas de Manizales S.A. E.S.P. Although indicators of water supply conformity for the state-owned companies are not available, the water quality in Manizales was known to be high during previous years. This indicator, since at least 1996, has been 100 percent with 24 hours of service continuity.

2.6.4. Labor Component

The increase in the numbers of employees over this 12 year period (1994-2006) cannot be explained by the city's growth, as the indicator of number of employees per 1,000 connections shows the same behavior, although this data is only available beginning in 1997, as seen in Figure 43 and Figure 44.

Figure 43. Evolution of No. of Employees

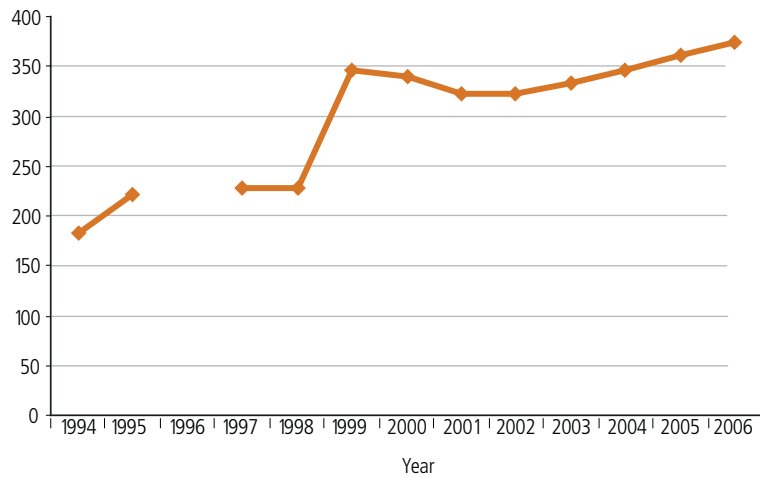
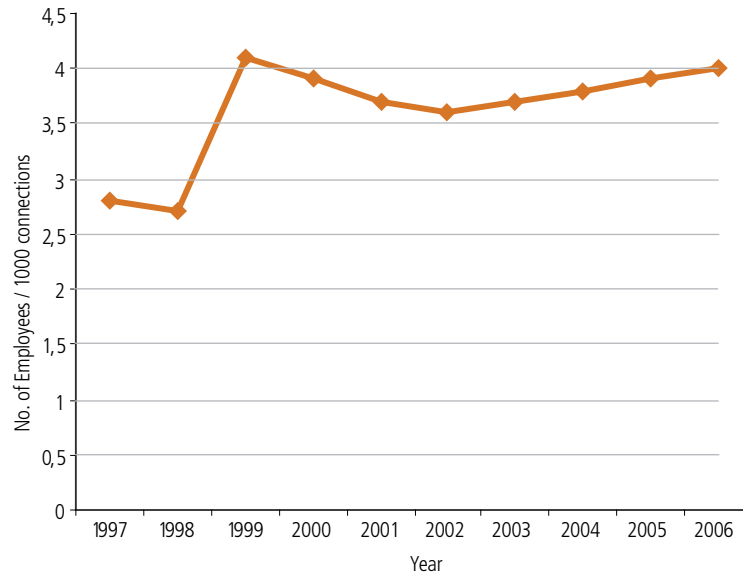
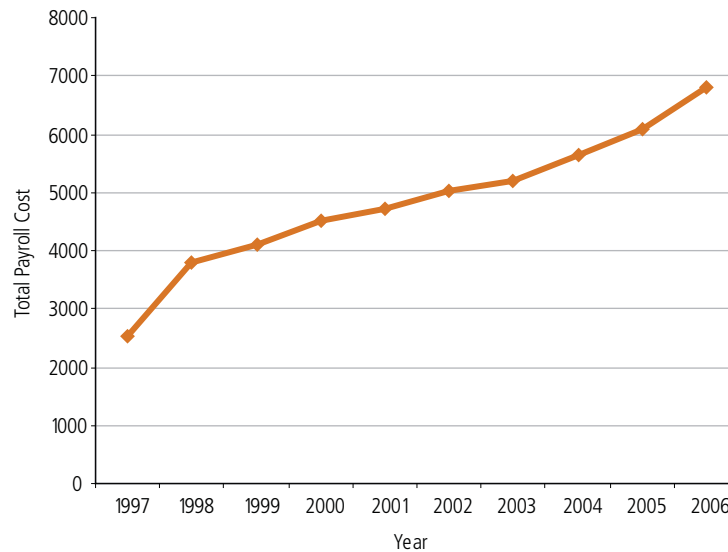


Figure 44. No. of Employees / 1000 connections



A significant increase took place between 1998 and 1999, when the number of employees rose from 227 to 347, followed by three years of decline until 2002, when the total number of employees per 1,000 connections once again began to increase.

Figure 45. Total Payroll Cost Variation

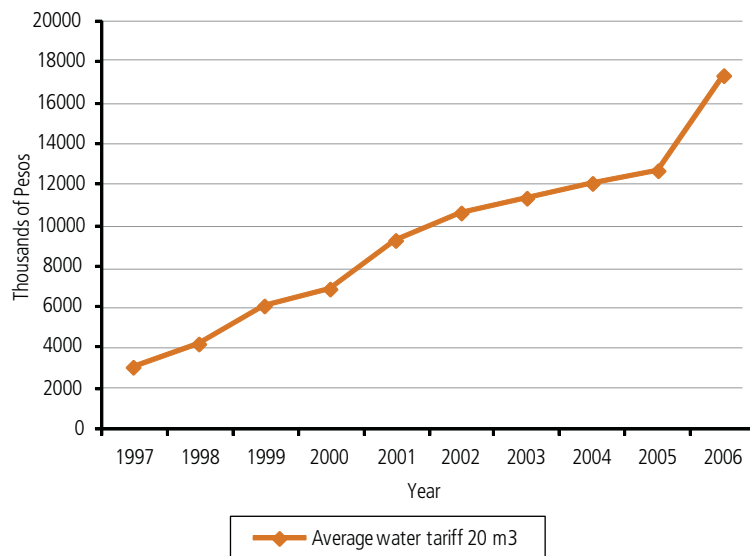


The evolution of the total payroll cost is in line with the above, escalating from COP\$ 2,538 million in 1997 (when information first became available) to COP\$ 6,792 million in 2006, as seen in Figure 45.

2.6.5. Evolution of Tariffs

Information on average water and sanitation tariffs for consumptions of 20m³ became available beginning in 1997. As can be seen in Figure 46, it has shown a logical behavior with strong annual growth between 1998 and 1999, as well as between 2000 and 2001. These increases, though, are lower than the major tariff increase in water experienced between 2005 and 2006, from COP\$12,650 to COP\$17,260, seemingly due to a new tariff schedule.

Figure 46. Variation of Water Tariffs

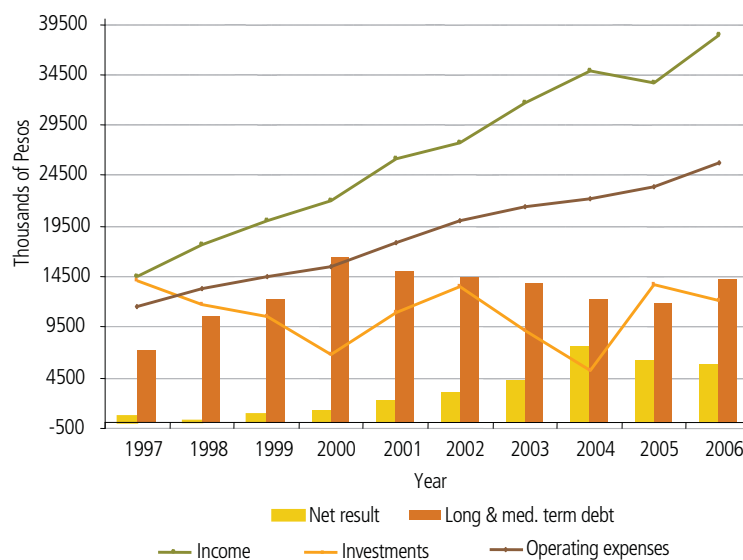


2.6.6. Financial Performance

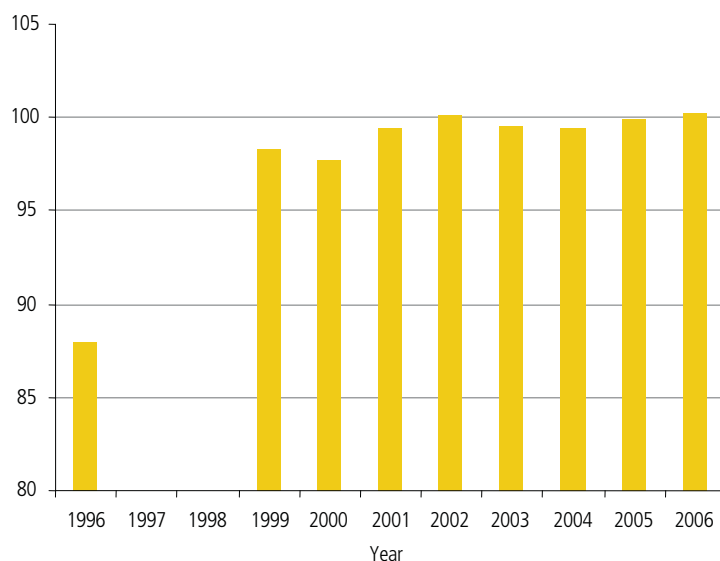
As illustrated in Figure 47, and following the ongoing tariff increase, in the first ten years of operation the concessionaire had a continuous income growth. The only exception is 2005 where there is a slight decrease compared to 2004. The progressive improvement in net profits stands out, illustrating that as a result of the company’s business orientation it was possible to maintain and improve the quality of service, and at the same time, generate more profits for its shareholders and, therefore, for the city. This becomes even more relevant when we note that

the level of debt was controlled and is always lower than income, and the position is further strengthened when we take into account the income to be generated from the expansion projects in which the company is involved. This could represent a greater availability of resources for investment in the city without affecting tariffs.

Figure 47. Financial Performance of Aguas de Manizales S.A. E.S.P.



The information regarding collection efficiency is available starting in 1996, except for 1997-1998, and it reveals a significant increase of 10 percent between 1996 and 1999. After that, it remains at very high levels, with a slight increase in 2001, exceeding 99 percent, after which it never drops below this value. The values in excess of 100 percent in 2002 and 2006 stand out, and are probably due to the good management of the portfolio from previous periods.

Figure 48. Evolution of Collection Efficiency

2.6.7. Lessons Learned

In the mid 1990s, the city of Manizales was one of the few exceptions in Colombia where the provision of public services could be considered equitable. Nevertheless, there was a concern that the general situation existing at a national level might extend to the city as well, as it depended entirely on the municipal administration and was thus subject to political uncertainty. Furthermore, with the opening to private participation, through Law 142 of 1994, there was the possibility of changing the status of the company, from state-owned to mixed economy, making the contracting process easier. In addition, the new legal framework provided an opportunity for expansion to other regions in the country, and to that end, it was essential to become more competitive by providing the company with a new approach.

Although the state-owned companies had mostly generated satisfaction at a local level, the arrival and consolidation of Aguas de Manizales S.A. E.S.P. produced improved indicators. These made it possible to gain real knowledge of the management, thus acquiring national recognition and making it easier to expand into other regions.

The company's recent expansion to Departments in the Northern Coast of Colombia demonstrates the success of the reform as it resulted in higher competitiveness and provided the company with recognition at a national level. This will translate into benefits for the city with new resources for the company through channels other than tariffs.

Although the quality of the water and sanitation services provided by the state-owned companies was quite good, the infrastructure was optimized after the reform, clearly improving the coverage of sanitation and the measurement of produced water volumes. The unaccounted for water index thus became more reliable, and it has gradually decreased since the beginning of this decade owing to significant investments to this end. As a result, the Concessionaire was able to consolidate excellent indicators by maintaining those that were correct and focusing on those in need of improvement.

The financial performance has been a clear demonstration of the business approach adopted by the company created with the reform. Consequently, there have been considerable improvements in collections, with the growth of revenues outpacing the operational expenses, and increasingly better net profits, with the debt level under control. While there is a clear influence of the constant tariff increases in the income and results performance, largely due to changes in the regulatory framework, the trend is highly positive, considering the resources that the company will obtain through its participation in new markets.



2.7. PROACTIVA Aguas de Montería S.A. E.S.P.

2.7.1. The Transformation Process

Historically, a wide range of entities of varied nature have been in charge of the construction and operation of water and sanitation systems in Colombia. At the beginning, the municipalities or private parties (under a municipal concession) executed and operated these works. In other cities, the municipalities were in charge of these functions, receiving sporadic support from the Nation and the Departments. The requirements of Law 142 of 1994 allowed for greater private participation in the sector.

In the specific case of Montería there has been private capital involved in the transformation of the sector. The potential coverage of its water system was 72 percent, but due to rationing for up to 24 hours, three times a week, the actual coverage was 35 percent and the water quality was poor. Losses exceeded 87 percent, with a collection efficiency of 60 percent. As a result of all this plus a fragile financial situation, the Empresa Municipal de Montería was wound up by a decision of the National Government and with its support through the Corporate Modernization Program of the Ministry of Environment, Housing, and Territorial Development, which played a major role in the project's development and success.

A program for the voluntary retirement of the workers was implemented, and three cooperatives were set up for public service provision, as well as a limited liability company which provided services during the transition period.

Sociedad de Acueducto y Alcantarillado de Montería (SAAM) was established on February 3, 1994. The equity structure of the new company was 60 percent municipal and 40 percent private. Among others, the former employees participate in the private capital. The company reported satisfactory efficiency indexes compared to those at the beginning of the process. The ratio of employees per 1,000 subscribers dropped to 4.32 and service continuity reached 83 percent.

There was a call for tenders to bid through Resolution No. 01966 of May 28, 1999, issued by the Mayor of Montería exercising its constitution and legal powers, with the intention of selecting a Concessionaire to execute a concession agreement to finance the works, expansion, rehabilitation, maintenance and operation of the public service water and sanitation infrastructure in the city of Montería .

The corresponding bid opened on July 7, 1999, and closed on October 1 of the same year. As a result of the ranking of the proposals, the Mayor of Montería awarded the contract to Consorcio FCC, with the concession beginning on January 1, 2000.

2.7.2. Most Relevant Contractual Aspects

The purpose of the contract is to grant a concession to finance, expand, rehabilitate, maintain and operate the public service water and sanitation infrastructure and related activities in the City of Montería .

The Concession is for twenty years beginning on the date of approval of the insurance policies securing the Concession Agreement. The most relevant obligations included are the following:

Table 27. Selected Relevant Contractual Aspects

Obligations for the Municipality of Montería	Obligations for the Concessionaire
<ul style="list-style-type: none"> • Conveying all the assets of the city's water and sanitation system, including the network and user cadastre, current works and systems, lands and rights of way that are part of the concession; • Delivering to the Concessionaire, as and when due, the corresponding contributions from the municipality and the Nation; • Creating a trust to manage the contributions from the Nation and the Municipality that have to be turned over to the Concessionaire; • Respecting the tariff established in the Concession Agreement; • Maintaining in favor of the Concessionaire the exclusive service area; • Pledging the resources derived from the municipality's tax sharing in the regular revenues of the Nation; • Establishing the Liquidity Facility Program in the Industrial Development Institute (Instituto de Fomento Industrial, IFI), or its replacement or any other financial entity of the same category, with the cost payable by the Concessionaire; • The Municipality will be required to define the socio-economic strata of new urban developments within the three months of the Concessionaire's application. 	<ul style="list-style-type: none"> • Carrying out the Financial Closing in accordance with the Bidding Conditions and the Concession Agreement; • Establishing a Trust fund and depositing in it, as a fund available to the office of the Mayor of the City of Montería, the amount of COP\$2,687.7 million. These funds will be allocated, by order of the Mayor, to the payment of assets in the winding up of SAAM by the Municipality, in compliance with Minutes of May 4, 1999, as approved by the Shareholders Meeting of May 10, 1999; • Water quality. The quality of the water supplied to the users must, as a minimum, comply with the requirements of Supreme Decree No. 159 of 1984. The quality of treated wastewater must satisfy the requirements set forth in Decree No. 1594 of 1984; • Water pressure: The water pressure must be 10 m.c.a. measured at the point of residential connection. The Concessionaire must meet these targets within the first three years of the Concession; • Service continuity. The water provision service shall be continuous, without interruptions due to anticipated system failures or inadequate capacity, and its availability must be guaranteed 24 hours a day; • The Concessionaire must operate, clean, repair, replace and expand the sanitation system so that in dry weather there will be no flooding of roads measured in terms of affected real estate or areas. The Concessionaire must schedule and execute replacement works that help minimize infiltrations from the surrounding land and faulty connections in rainy weather; • Over the period of the Concession, the Concessionaire will be responsible for the operation and maintenance of all assets received from the Municipality. At the end of the Concession, these assets must be returned to the Municipality in good operating conditions; • Billing usage to each user and carrying out the required collection actions, as necessary. The Concessionaire shall install micrometers for all system users; • Every five years the Concessionaire will submit to the Municipality of Montería an Investment Plan for the following five years, in accordance with the targets set in the Bidding Specifications, the Proposal and the Agreement.

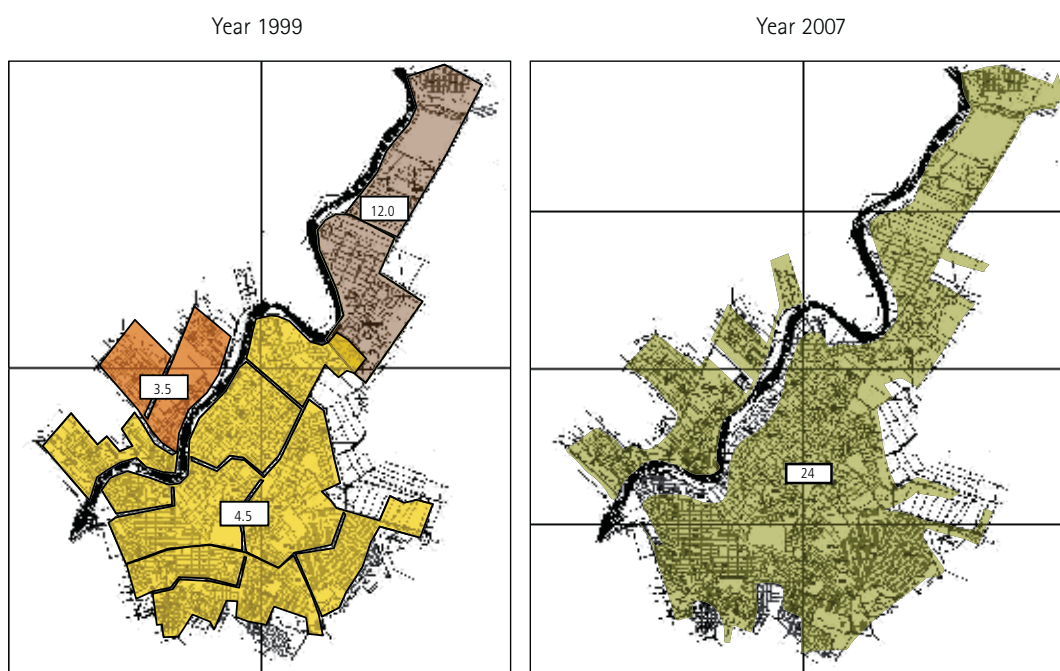
2.7.3. Service Quality

The two most outstanding aspects of the management conducted by PROACTIVA Aguas de Montería in the city correspond to service continuity and the level of micro-metering. These two indicators clearly evince the impact of the arrival of the operator on the quality of life of the population. Shifting from six hours a day

– and as low as three in some sectors – to more than 23 hours a day with water supply in all sectors of the city, undoubtedly makes a difference in the quality of life, clearly seen in Figure 49.

Moreover, in a context like Colombia's, where there has been an evolution concerning the value attached to water supply as an asset that requires expensive processes, and where losses have a cost effect for end consumers, it is surprising to see that a city with more than 30,000 connections only had 797 meters installed. The indiscriminate use of water that this generated had a direct impact on the company's costs.

Figure 49. Evolution of the Continuity Level in the City of Montería

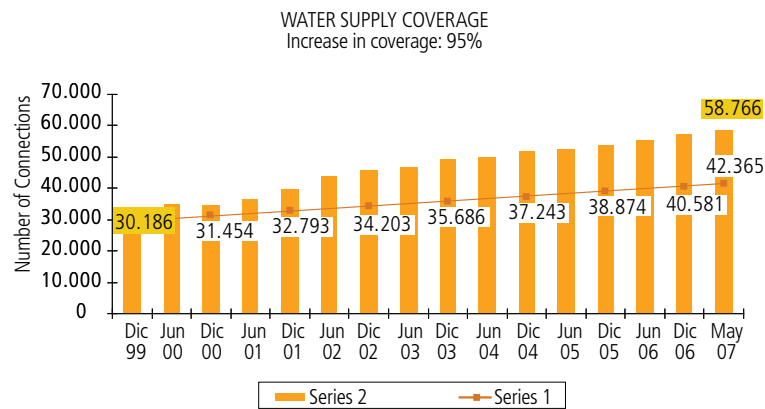


Source: PROACTIVA Aguas de Montería S.A. E.S.P.

Although Montería had water and sanitation networks covering a considerable area of the city, provision was discontinuous or simply nonexistent. The Works and Investments Plan developed by HIDROTEC, by indication of the Ministry of Environment, Housing and Territorial Development, called for extensive investment that made the business unsustainable. For that reason PROACTIVA Aguas de Montería S.A. E.S.P. reviewed the studies and decided that with minor

works in the major networks, the service could be provided in a more continuous way, increasing the number of users of the water network. Increasing the number of water supply connections to 94.5 percent and the sanitation connections to 60 percent in seven years of operation is in itself an important achievement in commercial terms. But in the case of Montería, it is also a relevant technical achievement demonstrating the success of the local engineers and the highly specialized ones brought in by PROACTIVA Aguas de Montería S.A. E.S.P. Figure 50 illustrates the increasing number of connections between 1999 and 2007.

Figure 50. Evolution of Number of Water System Connections in Montería



2.7.4. Commercial Management

The unaccounted for water index for 1999 of 64 percent, according to data provided by the company, demonstrates the condition of the distribution infrastructure, as well as the level of management of the predecessor of PROACTIVA Aguas de Montería. The evolution to the current 38 percent is the result of permanent works in the system and on the users' consumption behavior. Figure 51 illustrates how water supply production has been optimized compared with the significant increase in the number of connections, and reflects the high level of squandering in times of SAAM.

Figure 51. Production, Billing and Losses in Water Volume vis-à-vis Population in Montería

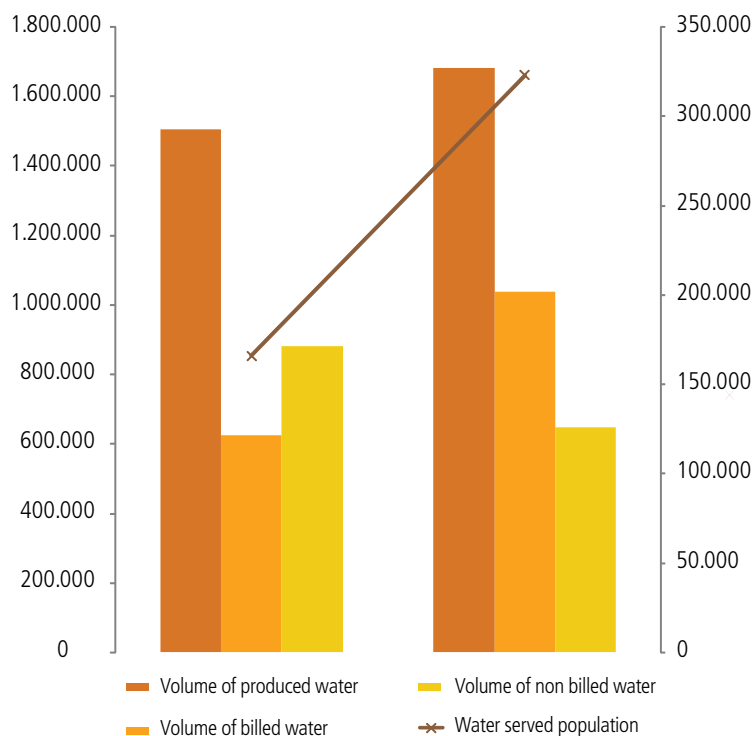


Figure 52 shows an analysis of water network replacement and extension indicators – in km of installed pipelines – which illustrates the huge economic effort made by the company, the municipality and the National Government through contributions for specific purposes. The replacement indicator, together with the annual indicator of repairs of broken parts (Figure 53) is a clear example of the condition of the treated water pipelines. In fact, it is not strange that contrary to the case in other cities, where there is a reduction in the number of leaks repaired due to a more efficient management, in Montería there are dramatic increases. Undoubtedly this is due to the fact that works are finally being carried out in the network, as points of water leakage are detected.

Figure 52. Extension and Replacement of Water Network in Montería

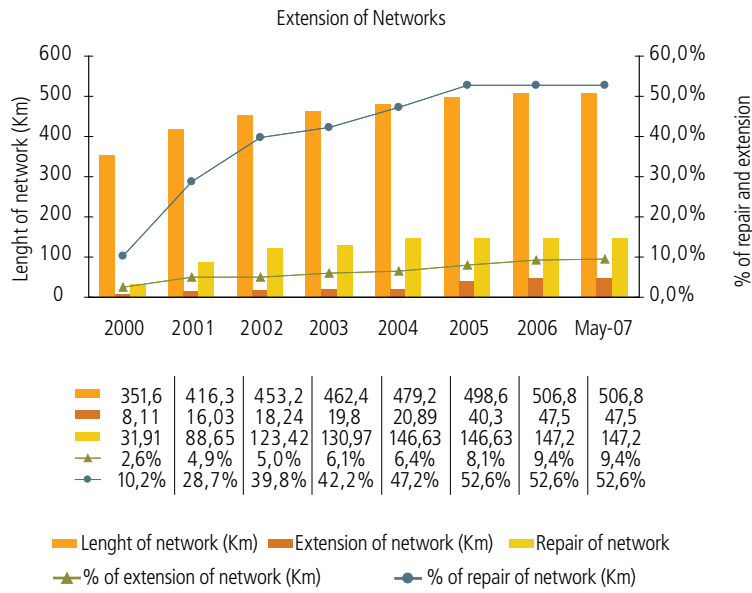
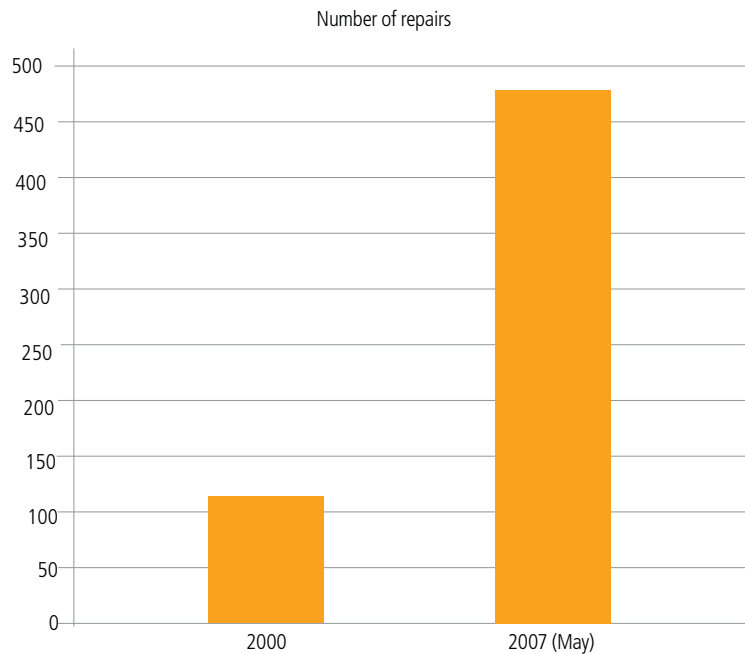
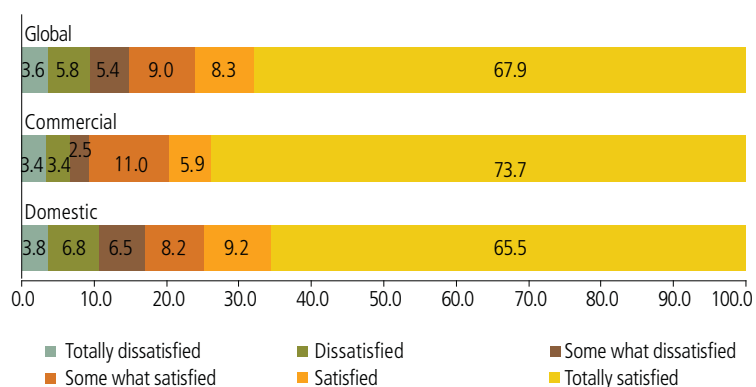


Figure 53. Number of Leaks Repaired in the Main Water Network



The indicators for community satisfaction and acceptance of PROACTIVA Aguas de Montería present important progress which will likely consolidate over time. Nevertheless, it reflects the impact of the company's aggressive management intended to achieve technical and commercial sustainability for the 20-year term, and for when the operator leaves. The four initial segments in the figure are sufficiently representative to indicate that doubts remain regarding PROACTIVA's performance in Montería, which is only natural considering the intervention of public roads to build the network, install micrometers (including meter changes due to under-billing), and tariff increases, among other destabilizing factors.

Figure 54. Level of Customer Satisfaction with the Provision of the Service by PROACTIVA in 2006

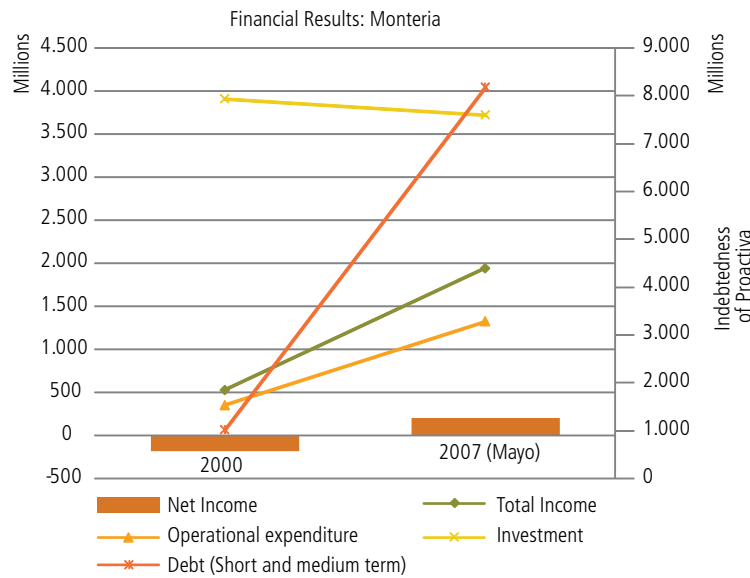


Source: CRITERIUM survey.

2.7.5. Financial Performance

Income grew from COP\$531.0 million (approximately US\$ 253,754 in 2000) before the concession to COP\$1,945.5 million (approximately US\$ 917,853 in 2007), with a 27.45 percent increase in the collection rate. The water and sanitation system has improved with the concession in the Municipality of Montería, and today it is a sustainable system from the technical and economic point of view.

Figure 55. Financial Results of the Operations of PROACTIVA in Montería



Source: PROACTIVA Aguas de Montería S.A. E.S.P.

2.7.6. Lessons Learned

Montería is the only case of a concession in Colombia where investment is exclusively borne by the operator or concessionaire. A business model where the risks are almost entirely borne by the operator seems to work well in cities where there is a high potential for improvement, with a well balanced combination of types of users so that income does not depend exclusively on subsidies.

Cultural changes in Montería since the arrival of a private operator have been the main obstacle for the unanimous acceptance on the part of service users. However, the achievements so far seem to confirm that eventually the benefits for everybody involved will overcome such resistance, consolidating the permanence of private operators in Colombia.



2.8. SERAQA S.A. E.S.P.

This case study underlines the importance of cooperation between public and private entities. In this case, the municipalities and the specialized operator achieved optimum efficiency indexes with an outstanding service to the communities served, while developing a new business that did not exist until 1994: the provision of residential public utilities.

2.8.1. Private Participation as a Solution to the Lack of Supply in Tunja

In a desperate attempt to draw the attention of the national government to the shortage of water and poor sanitation conditions that the inhabitants of Tunja (Boyacá) suffered, the mayor decided to march to Bogotá, the country's capital city, to explain the serious problem represented by unsuitable for consumption water service less than six hours a day. This was compounded by the extremely poor condition of the water distribution infrastructure which, due to its damages and leaks, caused 65 percent of the water coming from the Teatinos dam to be lost.

Despite the fact that Tunja was one of the country's oldest cities, it was one of the most backward in terms of public utilities. The march succeeded in gaining a commitment of financial support from the government for some of the works urgently required; however, the local government decided to undertake a much more in-depth process, including the winding-up of *Empresa de Acueducto de Tunja* (EAT), through a partnership with a specialized operator who would co-finance the works required to rescue this capital city from its state of neglect.

The purpose of Concession Agreement 132 of 1996 between the municipality of Tunja and the company SERAQA was to co-finance investments for the operation, maintenance, restoration and expansion of the city's water and sanitation systems, for a 30-year term with each party committing to invest US\$ 22 million (1996).

The concessionaire's primary obligations included: (i) To operate, manage and maintain the water and sanitation system to ensure the efficient provision of the services; (ii) To prepare plans for optimization, improvements and expansion and to design the projects; and (iii) To apply the tariffs established in the agreement.

An additional role, resulting from the proposal presented in the bid and award process, was to carry out the investments contained in the Renewal, Improvement and Expansion Plan of PRME systems, equivalent to the contractual US\$ 22 million.

In turn, the municipality of Tunja was obliged to oversee the agreement, approve the investment projects and plans and participate with funding in the execution of the required works, as agreed in the project structuring.

The contract initially signed included the partnership of two companies with a successful technical background, which provided them with the "credentials" to successfully undertake this long-term project. The companies, selected as a consequence of the international bidding process were the partners AQUA DE COLOMBIA and SERAGUA, which formed SERAQUA TUNJA S.A. E.S.P. and started operating in November 1996.

These operators had the technical support of the Spanish company *Fomento de Construcciones y Contratos S.A. (FCC)*, majority shareholder of SERAGUA, with a vast background and specialization in comprehensive water management worldwide. In turn, AQUA DE COLOMBIA was fully sold to the Spanish company PROACTIVA, whose entry further strengthened the technical and business management in the city of Tunja and continues to this day.

2.8.2. Condition of the Infrastructure

Based on the background regarding the start of PSP in Tunja, one of the major problems faced by the new concessionaire was the condition of the infrastructure in light of the demanding contractual targets.

The main challenge was to optimize the supply, since with network losses of 65 percent of the water supplied by the source, the Teatinos dam levels showed a significant deficiency and kept the city in a state of sanitary alert. Even the city's

deep wells, built by the municipal administration in 1995 to provide an alternative to the critical situation, were operating poorly due to lack of maintenance.

The distribution system was in a very bad structural state, as a result of many years without any network renewal, which also caused complex health problems in the city since in some cases the population was supplied with non-drinking water. There was no control over system pressure, causing constant breakdowns and unsustainable water waste. The city's water and sanitation networks posed serious construction problems in many stretches and sections, as a result of the community's spontaneous but unqualified participation as an unavoidable response to the requirements not met by the municipal administration.

The most significant indicators at this time were: (i) six hours per day, on average, of service in the rainy season and two hours per day in summertime; (ii) lack of knowledge about the condition of the networks – for example, there was only one drawing for the entire system which had not been updated; and (iii) overpressure and pipe breaks.¹⁰⁰

As for sanitation, the situation was equally critical. In view of the discharge requirements of the communities of Tunja and due to almost total lack of collection systems, there were open discharges on tracks, roads, ditches and plains, accompanied by the resulting public health problems.

The new operator's broad technological knowledge was very positive for the operating conditions of the systems and it may be considered one of its major added values. In a short space of time it was possible to overcome the city's deficiencies and the company was consolidated as an efficient operator widely supported by the population. Over five years (1997 to 2001) the water and sanitation coverage increased from 85 and 78 percent to 100 and 98 percent, respectively. The use of high-density polyethylene for water networks, with no previous mass use in Colombia, facilitated the installation of large sections of pipes in a short period; this would not have been feasible with the technologies traditionally used in the country.

The investments contemplated in the PRME also included the optimization, equipment and implementation of the water treatment plant, thus restoring its designed installed capacity and consequently ensuring the water's physical, chemical and bacteriological quality according to the standards of Decree 475 of the Ministry of Health. Potable water is once again being supplied to the residents of Tunja, which lacked such an essential basic service during previous decades.

¹⁰⁰ Document "Reseña SERAQ.A", prepared by the Company's Communications Department.

The supply is also improved with work on the deep wells, which are sporadically used when there are failures in the quality of the dam's water.

During 1998 and 1999, Phase I of the "Water Master Plan " was implemented. The project included investments for approximately COP\$ 24 million in collectors and 12 km of interceptors and infrastructure works in the city's water and sanitation systems. The project execution began in 1999 and is currently being implemented under an inter-institutional agreement between the Ministry of Environment, Housing and Territorial Development, the municipality of Tunja and SERAQA TUNJA.

Phase II consisted of the intervention in the water networks under the unaccounted for water – UFW – program, developed in five phases during 1999, 2000 and 2001 to provide full coverage to the city of Tunja.

Under this program, the city was divided into 24 strategic districts with autonomous supply, duly monitored through macro metering, static and dynamic pressure control, reconfiguration of reading routes and assessment of micrometers, confirmation of property status of each user and determination and adjustment of the unaccounted for water index. The target is bringing it down to less than 30 percent. The results were soon evident because, with only 35 percent of the city divided into sections, there was a 13 percent reduction in the need for extraction from the dam.

2.8.3. Investments and Their Impact

SERAQA's revenues efficiently cover the average operating, administrative and investment costs of the service, but they cannot, nor could they at the time the agreement was signed, fully cover the extensions and expansions required by the system. This was the main reason to include in the financial closing of the business the proportional amounts of US\$ 22 million to be contributed by the municipality of Tunja and the specialized operator. Obviously, this amount was discounted from the tariff investment component and, therefore, the business became socially and politically feasible.

The contributions made by the National Government have been those required by the municipality to fulfill its contractual obligations. That is, the company has not benefited from contributions other than those originally expected.

Tables 29 and 30 show the value of the investments made by the Municipality of Tunja and SERAQA in the period 1996 to 2005:

Table 28. Investments of TUNJA Municipality from 1996 to 2005

Basic Works	Length (Km)	Value in '000 Pesos
1. Interceptors	15,6	11,863,484
2. Collectors, separation structures and rainwater channels	11	4,856,112
Sub Total		16,719,596
3. Wastewater treatment		
3.1 PTAR Doña Limbania		45,516
3.2 PTAR Tunja		2,211,572
3.2.1 Plot acquisition		581,352
3.2.2 Availability for first module of 120 lps		1,630,220
Sub Total		2,257,088.73
TOTAL		18,976,684

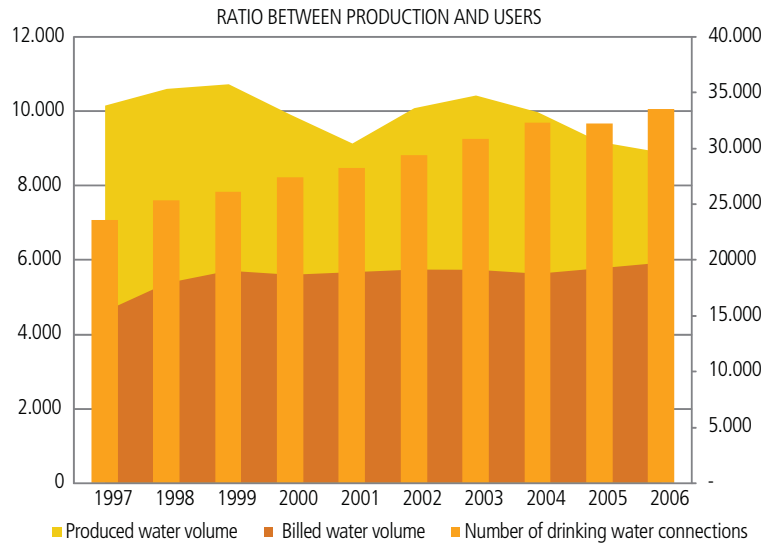
Table 29. Investments of SERAQA TUNJA from 1996 to 2005

Works	Length (Km)	Value in '000 Pesos
Expansion water works	44,74	2,107,302
Renewal waterworks	41,12	2,294,908
Expansion sanitation	16,18	2,045,630
Renewal sanitation	13,01	2,442,183
Equipment		2,643,954
Other investment works		8,618,647
TOTAL		20,152,627

The case of Tunja is undoubtedly one of SERAQA's major achievements. This city presented a major "shortage" against which the inhabitants and authorities of the municipality complained in 1996 and which had put the city at a high sanitary risk in the neighborhoods and communities. This same place today has the same or even lower production volume than in 1997; with an additional 42 percent of the population now being supplied.

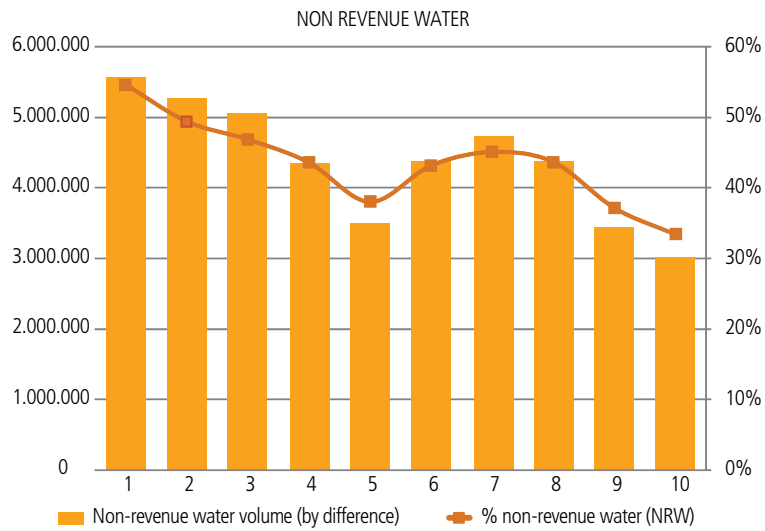
This is an important example of how a specialized operator's management optimizes water services, not always with high investments, but with specific actions within the system.

Figure 56. Growth of Users while Maintaining the Water Treatment Volume (production)



Source: Seraqa Tunja S.A. E.S.P.

Figure 57. Unaccounted for Water Index in Tunja



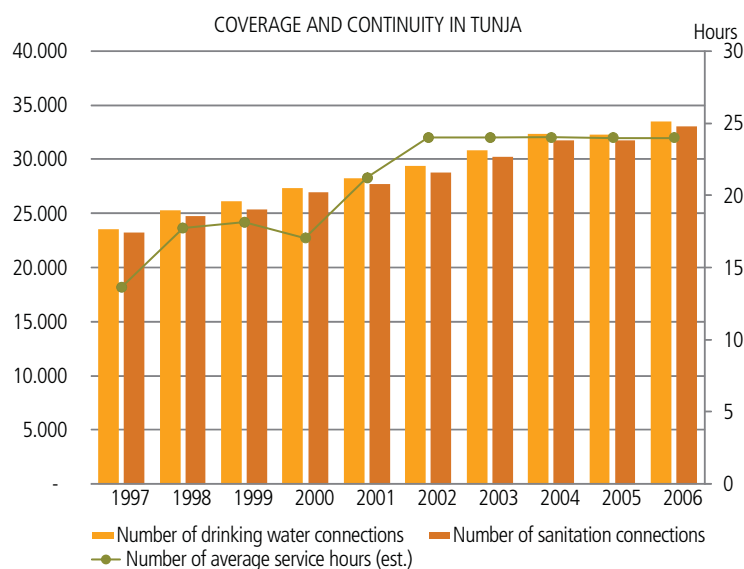
Source: Seraqa Tunja S.A. E.S.P.

The reduction of leaks, as shown in Figure 57 is the "unavoidable" effect of a management scheme for unaccounted for water implemented technically,

including active pressure control, network division into sectors, and fraud control, among other similar measures. The specialized operators have managed to reduce the average leaks in Colombia to levels that, as in Tunja, are no longer excessively high and are at the expected level for old systems or systems badly deteriorated, as was the case of the pipelines in Tunja until SERAQA took over. There is still room for major improvements; however, this must be compared with the investment levels required considering other system requirements in order of priority.

Tunja's service indicators reflect the operator's achievements. Service continuity grew from 14 hours per day, on average, in 1997, to 24 hours in 2002; this clearly shows a benefit experienced by the community. As to the coverage, there has been sustained growth over the last few years, as a response to the high incentive implied in the addition of new users.

Figure 58. Evolution of the continuity factor in Tunja and water and sanitation coverage



Source: Seraqa Tunja S.A. E.S.P.

2.8.4. Evolution of Tariffs

In Tunja, unlike other capital cities in the country, there is no socio-economic stratum 6 (high), which decreases the potential for cross subsidies. Thus, the municipality must contribute the subsidies for the poorest communities (see Table 30).

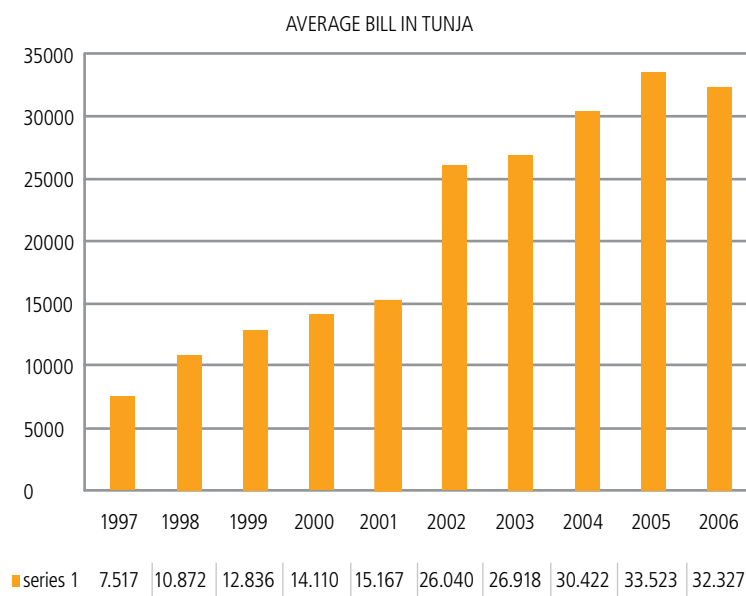
Table 30. Subsidies by stratum in Tunja, as approved by the Municipal Council for the year

Stratum	Fixed Charge Subsidy	20 m3 Consumption Subsidy
1	62%	55%
2	40%	40%
3	5%	NO

Before 2006 the subsidies were contributed by the business, i.e., charged to the profits of the company SERAQA. For the year 2006, the Municipal Council approved the creation of a Solidarity Fund of COP\$ 720 million (approximately US\$297,011 in 2006) to be distributed.

The reported average tariffs, based on the average annual bill, are seen in Figure 59.

Figure 59. Average Annual Bill in Tunja (1997 – 2006)

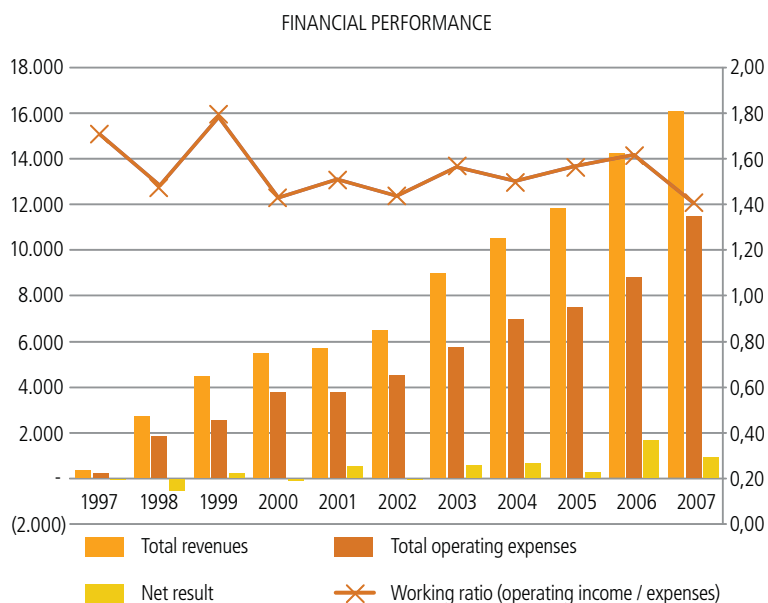


Source: Seraqa Tunja S.A. E.S.P.

As mentioned in the previous section, the concession scheme has favored the city because the investment contributions have not been charged to the tariff.

2.8.5. Financial Performance

Figure 60. Operating Income and Costs of SERAQA TUNJA



Source: SERAQA TUNJA S.A. E.S.P.

As in the other cities where a specialized operator was associated, SERAQA has focused its efforts on increasing its revenues based on the increase of the billing base (increase in water and sanitation coverage), efficient business management in collections, cut-offs of non-paying users, timely reconnection, and reduction of operating costs. The ratio of operating costs to income shows a downward trend, representing higher profitability for the operator.

2.8.6. Lessons Learned

SERAQA TUNJA is a clear example of the benefit inherent in the change of approach of the country's water and sanitation system management. The lack of a specialized operator, under any type of arrangement, including the transformation of a public operator, can represent an advantage for the users in any city. The proper and efficient provision of public utilities in a city does not necessarily represent any advantage for the city's economy, but having inefficient operators linked to local political elements can imply a drawback.

The transfer of technology from a foreign or domestic specialized operator represents an important professional growth for the employees, to the extent that, as in Tunja, given the high competence of SERAQA's employees, the operator did not need foreign officers. This, in addition to being an advantage for the city, since it generates specialized technical employment, represents an advantage in terms of personnel costs, which substantially reduces the cost of service provision for the operator and contributes to the sustainability of the business.

The resources committed by the municipalities or, otherwise, by the National Government, are absolutely necessary to undertake the business of sanitation management without increasing tariffs considerably. In this sense, cities and populations must have a well-structured technical support that expedites access to these resources. The case of Tunja has been an example of this situation where the operator, due to its knowledge of the system, has contributed with the mayor to a successful management of the resources.

3

Assessing the Effect of Private Participation in Water Supply and Sanitation



Over the last two decades, most countries in Latin America underwent structural reform programs that promoted different types of private sector participation such as privatization, concession, and private management of previously state-owned enterprises (SOEs). Although these reforms substantially affected the provision of infrastructure services in the region, it should be noted that they were unequal across sectors. For example, while the telecommunication and electricity sectors have been broadly privatized, private participation in water supply and sanitation (WSS) has been limited and concentrated. Colombia is a good example of private expansion in the WSS sector.

This chapter analyzes the impact of private participation in the provision of WSS. The analysis contributes to the literature of private participation in infrastructure (PPI) in different ways. First, the chapter presents the methodology proposed by Andres, Foster, and Guasch (2006) to WSS, performing a systematic analysis that combines operational indicators such as output, input, efficiency, quality, coverage, and prices to financial indicators such as operational costs and revenues. This complete analysis allows us to address the effects of privatization from the perspective of consumers and firms. Second, the chapter evaluates the introduction of private participation at the local level, taking into account the fact that within the same utility private participation expanded to different cities in different years. Third, it organizes an unbalanced panel of 118 cities (77 utilities) that experienced some form of private intervention between 1995 and 2006. The results suggest that private participation is associated with higher levels of output, productivity, efficiency, and quality of services. Average tariffs also seem to increase as a consequence of private participation. One distinguishing aspect of the Colombian experience is that private sector participation increased employment in contrast with most of the

evidence reported by previous studies in privatization (such as Andres et al. [2008] and La Porta and López-de-Silanes [1999]).

We divide the period of study in three different phases: solely public participation, transition between public and private, and a private participation period, comparing the evolution of several indicators across phases.

The idea of such a methodology is to use the firm's initial performance as a "counterfactual" to evaluate the interventions that followed. In this way, we are able to isolate and measure the effect of each intervention on the indicators analyzed. The exercise is performed for both levels and growth rates of each indicator. In addition to measuring the direct effects of private participation, this procedure helps us in understanding if private intervention was also capable of affecting the indicators' original trends.

Our results show that private participation **is associated with significant expansion of water and sanitation services across time**. The number of water connections increased on average by 20.7 percent between the public and the transition period and by 9.6 percent after the transition period. Sewerage connections followed a similar pattern, increasing by 22.6 percent and 14.5 percent, respectively. The overall coverage improvement for water and sanitation added up to 23.3 percent and 31.3 percent respectively.

Quality, efficiency, and labor productivity measures also changed during the period of analysis. Continuity, measured by the average hours of service a day, had no significant change between the first two periods, but improved considerably after private participation took place. The overall effect was an average increase of almost 130 percent in continuity. The percent of non-billed water decreased by 12 percent between the public and the transition periods, and by 6.3 percent between the transition and private periods. Labor productivity, measured by number of connections per employee improved over 36 percent during the whole period.

Most of these findings are consistent with previous work in ownership change and private participation. The single exception is the evolution of number of employees. Employment levels increased significantly during the whole period of analysis, contradicting the traditional idea that private participation is associated with an increase in unemployment.

The amount of systematic empirical studies of the impact of changes in ownership on WSS still very small, probably due to the difficulty of securing appropriate data. Most of the work on this topic, including studies supporting this project, consists of case studies.

This chapter contributes to this literature in different ways. First, we perform a systematic analysis of private participation for WSS that combines operational indicators such as output, input, quality, coverage and prices to financial indicators such as operational costs and revenues. This complete analysis allows us to address the effects of privatization from the perspective of both consumers and firms. Second, we consider the introduction of private participation at the local level, taking into account the fact that within the same utility private participation reached different places in different years. Third, we organized an unbalanced panel of 118 cities (77 utilities) that experienced some form of private intervention between 1995 and 2006. All locations are within the same country so that utilities are subject to the same macroeconomic and regulatory environment, and likely to be affected by similar exogenous factors.

The rest of the chapter is organized as follows: Section 4.1 summarizes the relevant literature; Section 4.2 describes the empirical approach and the data used; Section 4.3 presents and analyzes the results found; Section 4.4 presents some additional considerations; and finally, Section 4.5 summarizes the final remarks of this chapter.



3.1. Literature Review

Theoretical literature in ownership changes and the role of government ownership of productive resources can be summarized in two main branches: The Social View (Shapiro and Willig [1990]) and the Agency View (Vickers and Yarrow [1988]; Shleifer and Vishny [1994]). The first view states that under certain circumstances, such as natural monopoly markets, profit maximizing and welfare maximizing outcomes might diverge. In this case, government ownership is expected to maximize social welfare in order to solve the potential inefficiency. In contrast with this idea, Vickers and Yarrow (1988) point out that SOE's managers lack the adequate incentives and monitoring to pursue social interest, while Shleifer and Vishny (1994) stress that political interests are not necessarily in line with efficient outcomes. Therefore, according to the Social View, private participation is associated with an efficiency loss, higher prices, and lower output, while it promotes efficiency and reduces costs according to the Agency View. In our empirical analysis we will test which of the two models applies to WSS in Colombia.

A growing number of studies attempt to evaluate the effects of private participation and ownership changes to SOEs. Megginson and Netter (2001) provide an excellent survey of the literature on the topic. Most of the studies, however, concentrate on sectors such as transportation (for example, Ramamurti [1996] and Laurin and Bozec [2000]), telecommunications (for example, Ros [1999] and Ramamurti [1996]), manufacturing (for example, Frydman et al. [1999] and Boorman and Vining [1989]) and electricity (Andres et al. [2006]).

Galiani et al. (2005) is one of the few comprehensive references studying the case of outcomes of private participation in water and sanitation, in particular for

Latin American countries. This study focuses on the effect of privatization of water provision in Argentina on childhood mortality. Private participation is estimated to have reduced childhood mortality by 8 percent, on average.

Ehrlich et al. (1994) provide good evidence of productivity differences between state-owned and privately owned firms. Using a sample of 23 comparable international airlines of different (and in some cases changing) ownership categories over the period 1973-1983, they developed a model of endogenous, firm-specific productivity growth as a function of firm-specific capital. This model is used as a basis for their fixed-effects regressions estimating a cost function in a simultaneous framework with input-demand equations. The study suggests that private ownership leads to higher rates of productivity growth and declining costs in the long-run, and that these differences are not affected by the degree of market competition or regulation.

Boardman and Vining (1989) used data from the 500 largest manufacturing and mining corporations in the world outside the United States, as compiled by Fortune magazine in 1983. They classified these firms as SOEs, Mixed Enterprises or Private Companies, and used four profitability and two efficiency measures. Their results provide evidence that large industrial mixed and public enterprises perform substantially worse than private ones. They also conclude that partial privatizations may not be the best strategy, since, according to their indicators, these perform quite similarly to SOEs.

Galal et al. (1994) compare the actual post-privatization performance of 12 large firms, mostly airlines and regulated utilities in Britain, Chile, Malaysia, and Mexico, with the predicted performance of those firms that had not been divested. Using this counter-factual approach, the authors document net welfare gains in 11 of the 12 cases considered, which is equal, on average, to 26 percent of the firms' pre-divestment sales. They find no case where workers were significantly worse off, and in three cases, workers significantly benefited.

La Porta and López-de-Silanes (1999) find that the former Mexican SOEs in their study rapidly filled a large performance gap with industry-matched private firms that existed prior to divestment. The former SOEs, which were highly unprofitable before privatization, became very profitable afterwards. Output increased by 54.3 percent, in spite of a reduced level of investment spending, and sales per employee roughly doubled. The privatized firms reduced both blue and white-collar employment by half, but those workers who remained were paid significantly more. The authors attribute most of the performance improvement to productivity gains resulting from better incentives, with at most one-third of the improvement being attributable to lower employment costs.

The positive effects of private participation are not a consensus in the literature. Villalonga (2000) performs a multi-sector analysis in 24 Spanish firms and finds no efficiency gain from privatization.¹⁰¹ The author argues that factors such as business cycles and foreign ownership are more important determinants of efficiency.

Frydman, Gray, Hessel, and Rapaczynski (1999) compare the performance of privatized and state firms in the transition economies of Central Europe, and explicitly try to control for selection bias. Their study is based on a panel of over 200 privatized and state-owned firms in the Czech Republic, Hungary, and Poland. In particular, their findings show that in the context of Central Europe, privatization has no beneficial effect on any performance measure in the case of firms controlled by insider owners (managers or employees), but that it has a very pronounced effect on firms with outsider owners. Their study also indicates that when privatization is effective, its effects vary considerably depending on the performance measure under examination. In particular, their findings show that while the effect of privatization on revenues is very large for some types of owners, ownership change has no significant effect on cost reduction. Finally, by obtaining firm fixed-effect estimates of the various effects of privatization and using different types of control groups, as well as by controlling for changes in the macroeconomic environment, the study attempts to deal with most kinds of selection biases that could potentially affect the results.

Parker et al. (2001) is one of the few studies addressing the impact of private participation on the performance of water and sanitation utilities. The authors evaluate how successful privatization and regulatory reforms were in improving water and sewerage industries in England and Wales. Despite the reduction in labor usage, they find no evidence that privatization improved productivity growth. On the other hand, output prices and economic profits increased significantly after the reforms.

Methodologically, Andres et al. (2006) is the work most closely related to this case study. The authors study the effects of privatization on the performance of 116 electric utilities in ten Latin American countries. The study suggests that ownership changes generate significant improvements in labor productivity, efficiency, and quality of the services during the transition between public and private. Gains after two years of private ownerships are much more modest.

101 Measured by rate of return on assets.



3.2. Empirical Approach

3.2.1. Methodology

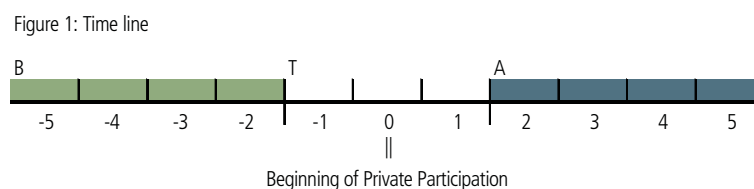
In order to effectively isolate the impact of private participation in WSS, each utility should be compared with its public "counterfactual", i.e. an identical firm, in a similar location, exposed to the same environment, but that remained completely operated by the government. However, such a "counterfactual" is extremely hard to identify. For this reason, the literature proposes the use of pre-private information of the same firm as a close approximation of the ideal counterfactual.

The methodologies for the estimation of the effect of private participation can be divided in two main branches: comparison of means and medians and econometric evaluation.

The first method was originally proposed by Megginson et al. (1994) and applied to a number of subsequent studies. It makes use of significance tests in order to compare the difference in mean and medians of a selected indicator before and after ownership change takes place. The second methodology follows the literature of program evaluation (see Heckman et al. [1985]) and treats private participation as a policy intervention. It proposes the introduction of a dummy variable for the period of intervention, which is frequently interacting with other variables of interest. The significance of the dummy indicates the effect of private participation. It is still unclear in the literature which methodology is superior. For this reason, this paper follows the two approaches and analyzes the sensitivity of the results to the methodology applied.

The sample of cities is split into three periods of analysis, as described in the timeline below. The transition period (T) is defined as starting one year before the date of the beginning of private operation and finishing one year after; the public period or period before privatization (B) is defined as the 4 years before the beginning of T; and a period after private participation (A) is defined as the 4 years after the transition.

Figure 61. Time line for transition from public to private participation



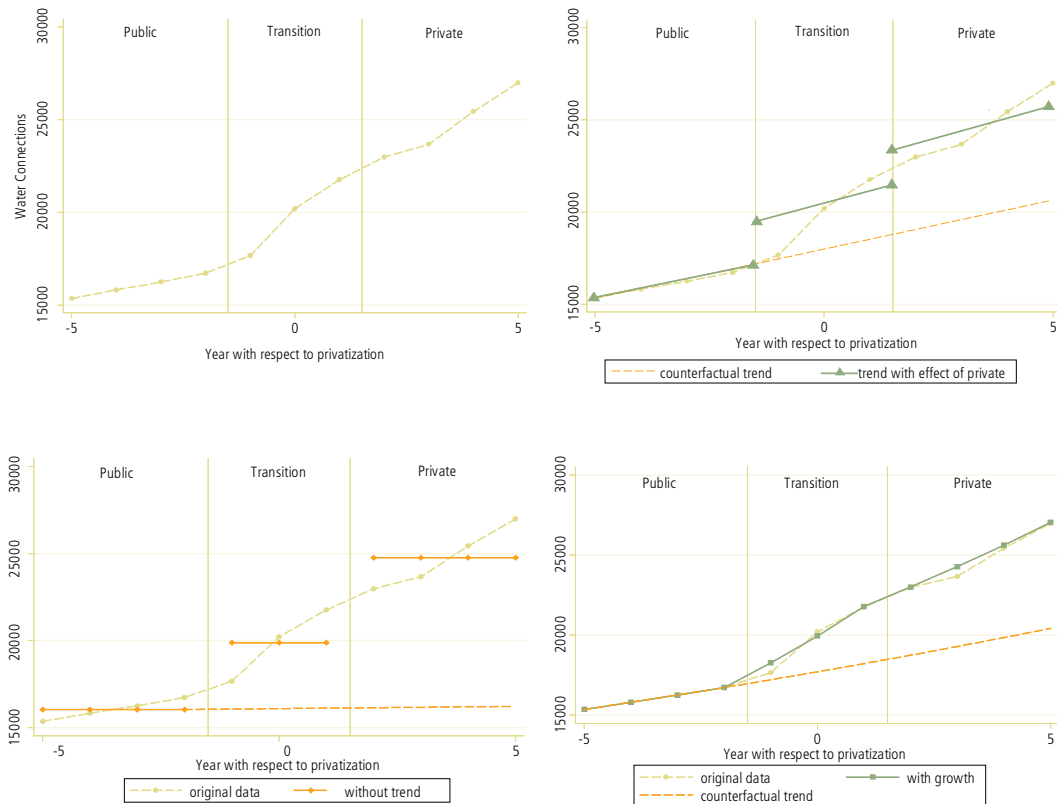
This division of periods, originally proposed by Andres, Foster, and Guasch (2006), helps us to separate short and long run effects of private participation. Most of the firms experienced some kind of reform in order to become more attractive to the private sector. In addition, a number of adjustments took place immediately after private introduction. Therefore, comparing the information before and after private intervention without taking into account the period of transition would produce biased results.

In addition to the comparison in levels as traditionally done in the literature, we allow for the possibility of firm specific time trends. Some indicators, such as number of connections, are expected to grow naturally with population. In this case, a comparison in levels would overestimate the effect of private sector participation. Finally we relax the hypothesis of a constant time trend and compare how private participation impacts the evolution, or growth rate, of the indicator analyzed.

The graphs shown in Figure 61 illustrate the different exercises performed. As we see, a comparison of changes in levels (in blue), shows a modest variation in the number of connections between B and T, and a large improvement between A and T. However, by taking into consideration the natural trend in connections (magenta), we notice that the effect of private participation is slightly larger during transition than after private participation. Finally, when we relax the hypothesis of constant trend and allow growth rate to vary across periods (red), we attribute most

of the variation of the number of connections to the transition period. The average growth rate in A is similar to the one in our counterfactual path.¹⁰²

Figure 62. Estimation with and without firm specific trend – Average number of water connections



We select a number of performance indicators¹⁰³ and analyze the changes between periods for both levels and growth of each indicator. In the first approach, three tests are performed in order to evaluate the significance of the changes. We use a paired T-test to compare means between groups, a paired

102 Counterfactual path assumes firms would continue growing as in B in the absence of private intervention.

103 These indicators are described in details in the data section.

Sign-test to compare medians and a Wilcoxon Sign-Rank test to compare the indicator's distributions in each period.

For the second approach, we start presenting a simplified version of model:

$$\ln(y_{it}) = \beta_0 \text{PRIVATE}_{it} + \sum_i \theta_i D_i + v_{it}$$

where y_{it} represents the indicator of interest, for city i at time t . The dummy PRIVATE_{it} indicates the participation of the private sector. Hence, β_0 , our coefficient of interest, captures the effect of privatization on the outcome analyzed. In order to account for unobservable city's characteristics that might systematically affect the outcome, we introduce city fixed effects defined by D_i . One common critique to this kind of models is that if privatized firms are systematically different (say, potentially more profitable), β_0 would be biased upwards. As pointed out by Frydman et al. (1999), adding fixed effects may reduce the selection bias of firms in the sample.

The focus of our study is to identify both transition and post-transition effects of the private participation. For this reason we decompose PRIVATE in two dummies: TRANS indicating the transition period (one year before private participation until one year after), and AFTER indicating the period after transition (two to five years after the beginning of private intervention). So, the first model to be estimated is:

$$\ln(y_{it}) = \delta^T \text{TRASNS}_{it} + \delta^P \text{AFTER}_{it} + \sum_i \theta_i D_i + v_{it}$$

In order to account for the indicator time-evolution we propose a second specification of the model that includes city-specific time trends:

$$\ln(y_{it}) = \delta^T \text{TRASNS}_{it} + \delta^P \text{AFTER}_{it} + \sum_i \theta_i D_i + \sum_i \theta_i t_i + v_{it}$$

City-specific time trend starts in the beginning of the pre-private period for each firm.

This specification will help to identify most of our conclusions for the variables displaying trends (for example, number of connections). However, it relies on the assumption that trends among the three periods of analysis are the same.

In order to relax this assumption, we will run a third set of equations similar to the first model, but using the annual growth in each indicator. In this case, we will be able to identify average changes in growth between the periods.

Given the fact that we are using a semi-logarithmic functional form of these models for each of the indicators, it should be remembered that the percent impact in each indicator is given by $e^{\delta} - 1$ (Halvorsen and Palmquist [1980]) when interpreting the coefficient estimates of the dummy.

In order to correct for potential non-spherical errors, a Generalized Least Square (GLS) approach would be appropriate. However, the GLS estimation requires knowledge of the unconditional variance matrix of \mathbf{v}_{it} , $\mathbf{\Omega}$, up to scale. Hence, we must be able to write $\mathbf{\Omega} = \sigma^2 \mathbf{C}$, where \mathbf{C} is a known $G \times G$ positive definite matrix. In this case, as this matrix is not known, we will follow a Feasible GLS (FGLS) approach that replaces the unknown matrix $\mathbf{\Omega}$ with a consistent estimator. We present both OLS and FGLS sets of results.

3.2.2. Data and Variable Choice

This research requires the construction of a panel of key indicators for the water and sanitation utilities. For this, we combined the information from Colombia's infrastructure information system (*Sistema Único de Información, SUI*) to statistical reports from the Water and Sanitation regulatory agency (*Comisión de Regulación de Agua Potable y Saneamiento Básico, CRA*). In addition, we consulted ADERASA (Association of Water and Sanitation Regulatory Entities of the Americas) benchmark studies and utilities' official reports to their investors. Finally, we applied a detailed survey to five of the main water companies¹⁰⁴, serving a total of 21 municipalities. Special attention was given to ensure consistency and comparability of the information over time and across utilities.

Instead of choosing the utility as the object of analysis, we chose to perform our evaluation at the city level. The main justification for this unusual subdivision is the fact that private sector participation, even within the same utility, reached different locations in different years. Our final sample consists of an unbalanced panel of 118 locations (77 utilities), that received some form of private intervention between 1995 and 2006. The sample represents approximately 26 percent of the population in Colombia.

104 Compañía de Acueducto y Alcantarillado Metropolitano de Santa Marta S.A., Triple A de Barranquilla S.A. E.S.P/ AAA Atlántico S.A. E.S.P, Sera. Q. A. Tunja, Conhydra S.A. E.S.P. and Aguas de Cartagena S.A. E.S.P.

The study focuses on different indicators of output, employment, labor productivity, quality of services, efficiency, coverage, prices, and financial aspects. Table 31 lists all the variables adopted for each analysis and Table 32 presents their summary statistics.

Most of these indicators have been analyzed in previous works for different samples. Andres, Foster, and Guasch (2006) used equivalent indicators of output, employment, coverage, labor productivity, quality, and prices to analyze the effects of private participation in electricity distribution in Latin America. Ros (1999) and Rumamurti (1996) studied similar indicators to evaluate ownership changes in telecommunication. Finally, Parker (2001) considered output, employment, quality, and prices when evaluating water and sanitation companies of England and Wales. A number of studies, such as Meggison (1994) and Anuatti-Neto et al. (2005) focus on the analysis of financial indicators of performance for a multi-sector analysis of privatization.

As output indicators we use the number of connections, the volume of water produced and the volume of water billed. Since one of the main expectations of the governments is that private participation (private investment, in particular) promotes a faster expansion of services, we used number of connections and volume of water indicators to measure the impact of private participation in this respect. The number of connections provides a good indication of the expansion of service at the extensive margin. The volume of water combines both extensive and intensive expansion. Theoretical predictions about changes in output are ambiguous, since larger output might not be the profit maximizing outcome for the privatized firm.

The Agency View theory on government ownership predicts that SOEs allocate resources inefficiently, over-employing workers, under-investing in capital and adopting inefficient technologies. According to this theory, therefore, we would expect labor productivity, measured by output per worker, to increase, employment to decrease, and production loss¹⁰⁵ to decrease with private participation.

Quality and price indicators, on the other hand, are important tools to assess consumers' perspective on private participation. The Social View predicts an increase in prices and a possible reduction of quality after private intervention. The Agency View, in contrast, argues that depending on the level of competitiveness, variations in both directions are possible. Previous empirical studies such as Andres, Foster, and Guasch (2006), and La Porta and Lopez-de-

105 Measured by percent of non revenue water and percent of metered connections (metering level).

Silanes (1999) report an increase in quality and cost of services after private sector participation took place.

Table 31. Definition of the Variables

<i>Output Indicators:</i>	Total number of water connections Total number of sewerage connections Volume of water produced (m ³ /year) Volume of water billed (m ³ /year) Volume of water billed per connection.
<i>Employment Indicator:</i>	Total number of employees
<i>Labor Productivity Indicators:</i>	Number of total connection per employee Volume of billed per employee
<i>Efficiency</i>	Percentage of non revenue water Proportion of connections metered
<i>Quality:</i>	Continuity (average hours of services/day)
<i>Prices:</i>	Average tariffs for Water services- Stratus 4 Average tariffs for Sewerage services- Stratus 4 Average tariffs for Water services- Stratus 1 Average tariffs for Sewerage services- Stratus 1
<i>Financial</i>	Revenues per m ³ Operational Expenditures per m ³ Labor Expenditures per m ³ Revenues per Connection Operational Expenditures per Connection Labor Expenditures per Connection Revenues/Operational Expenditure Labor Expenditures/Operational expenditures

Table 32. Summary Statistics

Variable	N	Mean	Median	SD	Min	Max
Population	118	85763.78	29517.18	166769.5	1935.458	1243591
Water connections	101	14801.52	4650.83	29046.29	25	183710
Sewerage connections	89	14062.33	3447	27577.72	20	177449
Volume of water produced (m ³ /year)	98	8692985	2119281	20600000	332	166000000
Volume of water billed (m ³ /year)	97	4309531	896881.3	10700000	291	86300000
Volume of water billed per connection	94	732.2	181.23	5331.22	3.22	51859.93
Number of employees	106	176.43	101.25	202.93	8.33	1070
Percentage of non billed water	89	51%	45%	20.80%	11%	98.50%
Percentage of metered connections	48	74%	86%	28.19%	1%	100%
Collection efficiency	35	68.99%	75.60%	23.55%	10.50%	97.52%
Volume of water billed per employee (m ³ /worker)	89	34718.67	12427.85	72340.38	53.36276	585294.1
Total connections per employee	91	130.1	72.19	168.04	1	1315.6
Continuity	50	15.99	18.93	7.6	2.91	24
Coverage water (%pop served/pop)	103	79.70%	81.45%	16.65%	33%	100%
Coverage sewerage (%pop served/pop)	88	62.43%	67%	28.22%	4%	96.10%
Opex per m ³ billed (1000 pesos 1998)	69	26.6599	1.40935	143.5101	0.0117	1188.401
Opex per water connection (1000 peso 1998)	74	3909.372	240.6895	24600	0.13648	211000
Revenues per m ³ billed (1000 pesos 1998)	68	41.86867	1.84962	231.0154	0.04726	1896.66
Revenues per water connection (1000 pesos 1998)	74	62.42.052	302.604	39400	0.20992	338000

Variable	N	Mean	Median	SD	Min	Max
Sales expenditures per m ³ billed (1000 pesos 1998)	62	5.19024	0.32518	24.22262	0.01106	188.6709
Sales expenditures per water connection (1000 pesos 1998)	71	680.363	45.77606	4067.13	2.295	34300
Average tariff water (S4) (pesos 1998)	79	13209.23	13256.14	3767.928	5264.367	22207.13
Average tariff water (S1) (pesos 1998)	82	6171.26	5769.28	3105.98	1130.42	19370.45
Average tariff sewerage (S4) (pesos 1998)	71	7072.53	6694.77	3167.69	2493.52	18293.47
Average tariff sewerage (S1) (pesos 1998)	72	4405.49	3923.96	2496.765	1575.55	15417.02

Note: each observation is the average for the available firm information from 5 years before the change in ownership to 5 years after



3.3. Results

3.3.1. Mean and Median Analysis

In this section we present the results of the Means and Median Analysis. We split the research between changes in levels and changes in growth for each indicator. Note that for some variables, like prices and financial indicators, changes in levels provide a more relevant analysis, while for others, like productivity and output, changes in growth lead to more accurate conclusions. We present level results for all the indicators strengthening the most relevant analysis.

The results for the level analysis are presented in Table 3 and the results for growth rates are presented in Table 4. In order to perform a meaningful comparison across firms of different sizes, we normalized the level of all indicators to 100 in the year of the beginning of private participation. We filtered the normalized indicators to avoid the effect of outliers. Our filter discarded observations that lie more than three standard deviations above or below the mean for each indicator. Columns (1) to (3) show the descriptive statistics of each indicator for the three periods of analysis: Solely public (B), referring to the 4 years before transition; Transition (T), a 3 year period starting one year before the beginning of private participation and ending one year after; and Private (A), consisting of 4 years after the transition. Columns (4) to (6) reflect the differences between periods. Column (4) presents the average changes between (T) and (B), Column (5) describes the changes between (A) and (T) and Column (6) compares (A) and (B). Finally, (7) to (9) presents the results for the significance tests in differences.

Table 33. Mean and Median Analysis in Levels

Variable	Mean			Difference		Teste Results				
	B	T	A	T-B	AT	A-B	T-B	AT	A-B	
Connec. W (total)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	
	mean	87.44	101.19	111.93	12.39	9.39	27.38	4.96	7.31	5.25
	median	88.38	100.11	108.13	10.05	7.61	24.93	3.29	5.96	3.18
	sd	9.45	3.8	12.58	9.34	10.27	18.81	0	0	0
Connec. S (total)	N	14	72	67	64	13				
	mean	82.83	100.9	112.2	15.69	11.2	27.42	5.52	5.15	6.17
	median	85.89	100	109.41	13.31	9.9	22.06	3.06	4.77	2.93
	sd	10.71	7.42	20.28	9.85	15.98	14.74	0	0	0
Volume Prod.	N	12	60	56	12	11				
	mean	105.55	101.03	101.87	-2.3	0.52	-0.87	-1.46	0.25	-0.75
	median	103.44	100	98.82	-7.57	-2.22	-6.19	-1.68	-0.16	-0.89
	sd	21.15	9.46	18.37	22.73	15.76	22.43	0.34	0.6	0.54
Volume Billed	N	11	65	61	12	12				
	mean	106.39	102.01	112.87	-4.36	8.22	4.78	-0.92	2.84	0.58
	median	104.45	100.37	107.95	-4.82	3.78	0.98	-0.71	2.43	0.53
	sd	18.97	6.87	25.89	15.69	21.05	24.35	0.22	0.17	1
Volume per connec.	N	11	62	56	11	9				
	mean	120.96	100.51	103.06	-19.29	0.53	-11.89	-4.24	0.19	-1.91
	median	115.65	100	97.46	-13.58	-3.98	-17.2	-2.85	-1.26	-1.78
	sd	18.06	6.78	25.17	15.06	20.15	19.72	0.01	0.13	0.11
N	11	61	54	11	52	10				

Variable	Mean			Difference			Teste Results			
	B	A	T	T-B	A-B	AT	T-B	AT	A-B	
Employees	mean	91.67	102.45	122.24	8.26	13.2	1.94	4.26	2.27	(t-stat)
	median	89.61	100.91	115.38	15.42	7.21	1.82	3.67	2.12	(z-stat)
	sd	26.55	7.74	38.41	21.27	27.36	0.23	0	0.06	(P sign-test)
	N	25	84	83	25	78	22			
Percentage of non billed water	mean	109.54	101.05	92.89	-9.55	-6.82	-2.12	-3.06	-2.3	(t-stat)
	median	104.39	100	91.75	-2.95	-7.6	-1.76	-2.88	-1.92	(z-stat)
	sd	21.84	5.83	16.02	18.03	15.74	0.21	0.02	0.42	(P sign-test)
	N	16	56	52	16	50	14			
Percentage of metered connect	mean	102.96	101.56	110.72	-2.49	7.35	-0.41	3.82	0.31	(t-stat)
	median	100.3	100	106.99	-1.5	5.09	-0.51	3.64	0.67	(z-stat)
	sd	14.91	3.51	12.59	15.86	8.38	1	0	1	(P sign-test)
	N	7	22	20	7	19	5			
Efficiency of Collection	mean	105	103.63	111.49	-3.46	3.42	0.07	0.07		(t-stat)
	median	105.7	100.51	105.37	-2.96	4.45	1.13	1.13		(z-stat)
	sd	4.07	6.93	21.74	4.62	14.55	0.17	0.17		(P sign-test)
	N	4	15	10	3	9				
Coverage W	mean	91.95	100.35	107.37	7.67	5.63	3.27	4.43	3.12	(t-stat)
	median	94.06	100	105.06	6.51	3.83	2.8	4.12	2.69	(z-stat)
	sd	8.83	3.32	12.04	8.76	10.07	0.01	0	0.02	(P sign-test)
	N	14	71	67	14	63	13			
Coverage S	mean	87.89	99.95	108.82	10.64	7.66	3.56	3.35	3.32	(t-stat)
	median	91.95	99.88	103.78	7.39	4.12	2.98	3.18	2.93	(z-stat)
	sd	11.43	7.03	22.9	10.33	16.83	0.01	0.02	0	(P sign-test)
	N	12	60	57	12	54	11			

3. Assessing the Effect of Private Participation in Water Supply and Sanitation

Variable	Mean			Difference			Teste Results		
	B	A	T	T-B	AT	A-B	T-B	AT	A-B
Continuity	mean	200.15	123.35	83.34					
	median	139.37	100.72	31.65					
	sd	152.31	35.49	142.19					
	N	28	38	28					
Volume Billed/ Employees	mean	116.02	100.07	0.01	4.8		-1.65	0.01	0.25
	median	114.31	100	0.96	12.62		-1.185	-0.21	0.78
	sd	27.88	13.81	2873	53.44		0.72	0.78	1
	N	8	58	51	8				
Total Connec./Employee	mean	85.89	103.28	9.9	27.87		5.99	6.88	6.18
	median	86.41	100.63	8.97	23.96		3.3	5.52	3.18
	sd	9.74	7.09	11.6	16.24		0	0	0
	N	14	74	65	13				
Average tariff W (S4) - Pesos	mean	83.07	99.13	21.77	36.16		2.61	3.69	2.61
	median	82.43	100	16.21	25.53		2.32	3.54	2.27
	sd	25.72	6.46	34.28	51.84		0.04	0	0.09
	N	15	40	32	13				
Average tariff W (S1) - Pesos	mean	72.63	102.24	48.63	79.98		5.82	3.63	4.21
	median	72.85	100	8.33	59.62		3.41	3.9	3.06
	sd	18.71	8.29	74.49	65.8		0	0	0
	N	16	41	31	12				
Average tariff S (S4) - Pesos	mean	88.93	101.04	22.48	33.99		1.27	2.77	1.7
	median	81.24	100	6.39	17.69		1.58	2.98	1.89
	sd	27.76	4.8	42.92	63.22		0.11	0.03	0.11
	N	10	34	28	10				

Variable	Mean			Difference			Teste Results			
	B	T	A	T-B	AT	A-B	T-B	AT	A-B	
Average tariff S (S1) - Pesos	mean	104.96	161.19	31.25	55.73	95.07	6.18	3.64	4.51	(t-stat)
	median	65.16	100.47	126.87	33.96	17.77	55.66	2.93	3.98	(z-stat)
	sd	15.62	11.11	83.08	16.76	81	63.23	0	0	(P sign-test)
	N	11	36	28	11	28	9			
Opex per m ³	mean	83.06	102.05	125.43	14.47	14.2	27.62	2.08	2.87	(t-stat)
	median	88.03	99.57	110.57	24.14	6.29	21.25	1.6	3.07	(z-stat)
	sd	21.09	29.85	58.12	20.84	30.47	36.52	0.5	0	(P sign-test)
	N	9	45	40	9	38	6			
Opex per connection	mean	106.41	105.08	137.44	-3.64	13.25	6.94	-0.47	2.41	(t-stat)
	median	104.77	99.75	109.33	-3.42	3.55	-1.93	-0.46	2.05	(z-stat)
	sd	31.15	30.38	69.21	24.51	34.32	35.12	0.75	0.33	(P sign-test)
	N	10	46	44	10	39	7			
Revenue per m ³	mean	78.74	100.07	132.57	17.52	16.97	33.51	3.99	3.18	(t-stat)
	median	83.83	98.84	118.76	15.69	13.31	27.66	2.67	3.1	(z-stat)
	sd	15.9	26.47	68.08	13.15	34.99	27.15	0	0.03	(P sign-test)
	N	9	50	46	9	43	6			
Revenue per connection	mean	100.84	102.39	133.15	-1.19	15.61	17.91	-0.3	3.2	(t-stat)
	median	97.3	99.09	116.78	1.57	10.41	21.65	-0.05	2.96	(z-stat)
	sd	21.75	26.27	58.26	12.66	31.96	23.98	0.75	0.01	(P sign-test)
	N	10	51	48	10	43	7			
Labor Exp per m ³	mean	132.4	108.42	132.58	-32.15	17.38	-40.81	-0.94	1.97	(t-stat)
	median	83.15	101.66	110.54	11.41	5.14	-21.16	-0.68	1.71	(z-stat)
	sd	105.11	29.64	75.33	89.9	52.83	61.39	1	0.4	(P sign-test)
	N	7	44	37	7	36	5			

Variable	Mean		Difference		Teste Results				
	B	A	T-B	AT	T-B	AT	A-B		
Labor Exp per connection	mean	130.24	-57.77	13.4	-67.09	-1.56	1.62	-2.1 (t-stat)	
	median	118.42	104.52	-12.22	1.21	-21.52	-1.86	0.99	-2.02 (z-stat)
	sd	111.51	70.82	97.77	51.08	71.56	0.45	0.42	0.06 (P sign-test)
	N	7	39	7	38	5			
Revenues/Opex	mean	101.3	99.7	-3.46	3.75	-2.81	-0.74	1.3	-0.47 (t-stat)
	median	95.7	100.42	4.23	1.81	-5.37	-0.7	0.83	-42 (z-stat)
	sd	23.07	25.94	21.86	20.77	24.91	0.83	0.68	1 (P sign-test)
	N	22	53	22	52	18			
Labor Exp/Opex	mean	125.35	94.68	-25.06	-4.51	-25.82	-2.2	-1.54	-2.18
	median	118.93	97.98	-14.76	1.39	-13.13	-2.42	-1.45	-2.7
	sd	48.2	22.73	49.57	19.12	47.21	0.02	0.76	0.02
	N	19	43	19	43	16			

Table 34. Mean and Median Analysis of Growth Rates

Variable	Mean			Difference			Teste Results			
	B (1)	T (2)	A (3)	T-B (4)	AT (5)	A-B (6)	T-B (7)	AT (8)	A-B (9)	
Connecc. W (total)	mean	4.85%	3.40%	3.78%	-0.57%	0.02%	-0.39	0.02	-1.51	(t-stat)
	median	4.15%	2.40%	2.68%	-0.03%	-0.62%	-1.67%	-0.16	-0.45	(z-stat)
	sd	3.17%	4.94%	5.39%	5.4%	6.88%	4.58%	1	0.53	(P sign-test)
	N	14	72	67	14	64	13			
Connecc. S (total)	mean	3.51%	4.07%	1.88%	3.71%	-2.36%	-1.88%	1.82	-1.4	(t-stat)
	median	3.63%	2.89%	2.28%	2.02%	-1.31%	-2.03%	1.8	-1.26	(z-stat)
	sd	2.23%	9.47%	6.94%	7.08%	12.41%	3.62%	0.04	0.68	(P sign-test)
	N	12	60	56	12	54	11			
Volume Prod.	mean	0.74%	0.52%	0.16%	-3.31%	-0.07%	0.33%	-0.94	-0.04	(t-stat)
	median	-1.07%	0.00%	-1.99%	-4.25%	0.61%	-1.64%	-0.76	0.25	(z-stat)
	sd	11.01%	11.14%	7.1%	11.13%	14.1%	13.68%	0.75	0.79	(P sign-test)
	N	11	65	61	10	59	11			
Volume Billed	mean	0.28%	1.70%	2.74%	-1.65%	1.40%	2.95%	-0.73	0.88	(t-stat)
	median	-1.49%	0.00%	1.68%	1.41%	-0.60%	1.65%	0	0.36	(z-stat)
	sd	6.85%	7.6%	10.7%	7.45%	11.60%	10.78%	1	0.78	(P sign-test)
	N	11	62	56	11	53	9			
Volume per connecc.	mean	-4.94%	-1.73%	-2.41%	-1.54%	-0.34%	4.98%	-0.8	-0.22	(t-stat)
	median	-5.28%	-2.21%	-2.43%	1.65%	-0.46%	-0.10%	-0.53	0.01	(z-stat)
	sd	4.71%	7.69%	8.83%	6.37%	11.41%	10.35%	1	0.68	(P sign-test)
	N	11	61	54	11	52	10			

3. Assessing the Effect of Private Participation in Water Supply and Sanitation

Variable	Mean			Difference			Teste Results			
	B (1)	T (2)	A (3)	T-B (4)	AT (5)	A-B (6)	T-B (7)	AT (8)	A-B (9)	
Employees	mean	1.75%	6.57%	2.56%	-5.74%	-1.90%	1.34	-3.18	-0.61	(t-stat)
	median	1.01%	3.85%	0.77%	5.75%	-1.32%	1.49	-2.53	-1.02	(z-stat)
	sd	9.94%	12.26%	11.11%	10.65%	15.93%	14.42%	0.23	0.14	1
	N	25	84	83	25	78	22			
Percentage of non billed water	mean	0.69%	-0.44%	-2.95%	-3.21%	-3.15%	-0.84	-1.54	-1.67	(t-stat)
	median	-0.05%	-0.66%	-2.87%	-4.44%	-2.49%	-0.15%	-1.55	-1.04	(z-stat)
	sd	1.46%	7.68%	11.7%	15.27%	14.4%	15.36%	0.08	0.11	1
	N	16	56	52	16	50	14			
Percentage of metered connec	mean	9.14%	2.48%	2.75%	-8.03%	-0.08%	-2	-0.08	-2.25	(t-stat)
	median	7.18%	0.12%	2.61%	-8.46%	0.00%	-8.09%	-1.69	-1.75	(z-stat)
	sd	10.05%	5.39%	2.52%	10.62%	4.53%	9.55%	0.45	1	0.38
	N	7	22	20	7	19	5			
Efficiency of Collection	mean	1.45%	3.86%	0.07%	-0.28%	-2.07%	-1.02	-1.02	-1.28	(t-stat)
	median	1.30%	0.19%	0.49%	1.57%	-2.31%	-0.89	-0.89	-1.64	(z-stat)
	sd	5.78%	9.19%	7.52%	6.31%	6.08%	4.54%	0.51	0.09	0.09
	N	4	15	10	3	9	13			
Coverage W	mean	2.87%	1.84%	2.32%	-0.67%	0.13%	-1.62%	-0.47	-1.28	(t-stat)
	median	1.70%	1.09%	1.44%	-0.26%	-0.56%	-1.29%	-0.35	-1.64	(z-stat)
	sd	3.73%	4.53%	5.31%	5.25%	6.63%	4.54%	1	0.45	0.09
	N	14	71	67	14	63	13			

Variable	Mean			Difference			Teste Results			
	B (1)	T (2)	A (3)	T-B (4)	AT (5)	A-B (6)	T-B (7)	AT (8)	A-B (9)	
Coverage S	mean	1.28%	2.24%	0.18%	-2.16%	-1.65%	1.84	-1.37	-1.57	(t-stat)
	median	1.37%	0.96%	0.42%	1.97%	-1.83%	1.8	-1.22	-1.42	(z-stat)
	sd	2.40%	9.53%	5.89%	6.96%	11.49%	3.48%	0.04	0.5	(P sign-test)
	N	12	60	57	12	54	11			
Continuity	mean		41.09%	19.03%	-22.81%			-224		(t-stat)
	median		12.27%	12.71%	-2.70%			-2.41		(z-stat)
	sd		58.35%	18.47%	53.84%			0.06		(P sign-test)
	N		38	29	28					
Volume Billed/ Employees	mean	3.05%	-0.19%	0.72%	-12.43%	1.43%	0.55%	-1.78	0.06	(t-stat)
	median	0.65%	0.00%	0.16%	-8.90%	0.05%	-3.60%	-1.68	-0.7	(z-stat)
	sd	15.67%	16.52%	14.57%	19.77%	20.71%	25.26%	0.29	1	(P sign-test)
	N	8	58	53	8	51	8			
Total Connec./ Employee	mean	4.60%	5.95%	2.75%	1.86%	-3.03%	-2.07%	1.43	-1.94	(t-stat)
	median	3.90%	3.62%	2.63%	2.03%	-1.92%	-2.20%	1.48	-1.78	(z-stat)
	sd	2.54%	8.4%	6.34%	4.85%	8.91%	3.84%	0.42	0.05	(P sign-test)
	N	14	74	66	14	65	13			
Average tariff W (S4) - Peso	mean	9.36%	2.99%	6.97%	-2.26%	3.92%	-7.73%	-0.38	1.8	(t-stat)
	median	8.53%	0.19%	6.68%	-7.61%	4.01%	-4.63%	-1.02	1.89	(z-stat)
	sd	10.8%	12.52%	10.40%	22.7%	12.30%	15.66%	0.3	0.37	(P sign-test)
	N	15	40	32	15	32	13			

3. Assessing the Effect of Private Participation in Water Supply and Sanitation

Variable	Mean			Difference			Teste Results			
	B (1)	T (2)	A (3)	T-B (4)	AT (5)	A-B (6)	T-B (7)	AT (8)	A-B (9)	
Average tariff W (S1) - Peso	mean	10.93%	7.36%	8.19%	-0.67%	3.58%	-0.08	1.58	-0.52	(t-stat)
	median	13.62%	0.37%	5.34%	-11.50%	4.15%	-3.23%	-0.63	1.68	(z-stat)
	sd	13.98%	14.33%	12.55%	30.32%	12.64%	15.52%	0.3	0.07	(P sign-test)
	N	16	41	32	15	31	12			
Average tariff S (S4) - Peso	mean	7.43%	4.81%	1.76%	-5.02%	1.97%	-4.01%	-0.89	1.02	(t-stat)
	median	8.12%	0.42%	2.58%	-6.77%	2.43%	-4.92%	-0.76	1.57	(z-stat)
	sd	19.1%	10.02%	13.47%	17.9%	10.21%	17.31%	0.75	0.08	(P sign-test)
	N	10	34	31	10	28	10			
Average tariff S (S1) - Peso	mean	14.97%	11.19%	10.30%	-9.99%	3.25%	-5.42%	-2.05	1.12	(t-stat)
	median	14.93%	0.87%	8.35%	-4.91%	5.28%	-8.44%	-1.69	1.84	(z-stat)
	sd	13.63%	21.07%	11.57%	16.19%	15.41%	18.27%	0.55	0.09	(P sign-test)
	N	11	36	28	11	28	9			
Opex per m ³	mean	11.35%	3.60%	4.96%	-0.28%	-1.46%	-5.57%	-0.04	-0.29	(t-stat)
	median	9.54%	-0.26%	5.66%	-5.12%	6.13%	-0.23%	-0.18	0.38	(z-stat)
	sd	7.12%	31.30%	8.45%	23.06%	30.08%	15.01%	1	0.26	(P sign-test)
	N	9	45	40	9	38	6			
Opex per conn ection	mean	0.34%	5.31%	7.22%	2.45%	2.21%	9.1%	0.36	0.44	(t-stat)
	median	-1.11%	-1.87%	4.32%	5.88%	5.42%	16.5%	0.15	1.67	(z-stat)
	sd	10.3%	30.24%	11.3%	21.2%	30.9%	14.5%	0.75	0.2	(P sign-test)
	N	10	46	44	10	39	7			

Variable	Mean			Difference			Teste Results			
	B (1)	T (2)	A (3)	T-B (4)	AT (5)	A-B (6)	T-B (7)	AT (8)	A-B (9)	
Revenue per m ³	mean	12.56%	1.78%	4.79%	-2.36%	0.58%	-0.56	0.12	-1.09	(t-stat)
	median	15.19%	0.82%	5.96%	-3.55%	3.35%	-0.77	0.76	-0.94	(z-stat)
	sd	7.42%	27.22%	13.5%	12.73%	31.24%	15.4%	0.5	0.54	(P sign-test)
Revenue per connection	N	9	50	46	9	43	6			
	mean	3.53%	1.97%	6.27%	-1.88%	3.11%	5.53	-0.5	0.071	(t-stat)
	median	1.93%	0.26%	6.34%	-1.67%	1.35%	7.27	-0.36	0.82	(z-stat)
Labor Exp per m ³	sd	10.24%	26.14%	13.91%	11.87%	28.82%	11.82	1	0.54	(P sign-test)
	N	10	51	48	10	43	7			
	mean	12.23%	4.23%	4.74%	-20.99%	-1.59%	-19.17%	-2.6	-0.28	(t-stat)
Labor Exp per connection	median	13.76%	0.00%	6.98%	-24.06%	4.63%	-11.66%	-1.86	0.75	(z-stat)
	sd	12.51%	31.03%	17.45%	21.34%	34.71%	32.10%	0.45	0.24	(P sign-test)
	N	7	44	37	7	36	5			
Revenues/Opex	mean	6.13%	5.31%	4.46%	-21.78%	-1.00%	-13.31%	-2.98	-0.14	(t-stat)
	median	10.95%	-2.33%	7.07%	-23.14%	9.42%	-12.21%	-1.86	1.18	(z-stat)
	sd	10.83%	38.25%	16.7%	19.3%	43.1%	32.93%	0.45	0.14	(P sign-test)
Labor Exp/Opex	N	7	44	39	7	38	5			
	mean	3.97%	-1.65%	-3.31%	-6.91%	-0.17%	-8.18%	-2.42	-0.07	(t-stat)
	median	4.91%	-1.08%	-0.38%	-8.46%	1.26%	-5.29%	-2.49	0.36	(z-stat)
Labor Exp/Opex	sd	8.97%	20.67%	12.63%	13.40%	17.70%	14.24%	0.05	0.68	(P sign-test)
	N	22	60	53	22	52	18			
	mean	-3.39%	-6.25%	-2.71%	-2.20%	3.96%	1.38%	-0.57	1.28	0.41
Labor Exp/Opex	median	-3.52%	-3.87%	1.17%	2.94%	5.41%	6.98%	0.76	2.13	0.67
	sd	13.42%	23.02%	11.52%	16.73%	20.36%	23.31%	0.16	0.01	0.21
	N	19	53	43	19	43	16			

A. Output Indicators

The number of water connections, our first output indicator, changes significantly during the whole period. It increases on average 27 percent compared to the period before private participation. The findings are more modest when we take into account the evolution of growth rates. The number of water connections faced a positive trend even before private participation took place. No significant changes in growth rate happened between B and T, and T and A, but when comparing the initial and final periods we notice a small reduction in the rate of expansion. The number of sewerage connections increases significantly in all phases of the analysis in levels. It varies on average 15.7 percent between B and T and 11.2 percent between T and A. The growth analysis confirms a positive change in rates of expansion during the transition period, but this result does not persist in the A period.

The third indicator, the volume of water produced, had no significant change over the period of analysis. One possible explanation for the puzzling stagnation is that the expansion in services was counteracted by a decrease in water losses, so that the new demand was covered without having to increase production. Further analysis is necessary in order to justify this conjecture.

The volume of water billed did not change significantly in levels during the transition, but it increased by almost 8.3 percent after private participation took place. The variation was much smaller than the increase in water connections, suggesting that the expansion of services at the extensive margin was counterbalanced by a reduction at the intensive margin. This result is confirmed by the reduction of approximately 11.9 percent in the average volume per connection – since average volume per connection is measured through the volume of water billed. This suggests that the increase in the water billed was not proportional to the increase in number of connections. The analysis in growth rates, however, did not support the idea that private participation affected the trend in which these indicators evolved.

B. Number of Employees

Most of the work in ownership changes shows that SOEs were oversized in personnel, and both transition and private participation are associated with significant reductions in the number of employees. The results for Colombia do not support this prediction. The number of employees increased by 8 percent between the public and transition period, and by 13 percent after the transition period ended.

This unusual result could be linked to the evolution of WSS in Colombia. The constitution of 1991 decentralized the responsibilities of water and sanitation provision to the municipal level. During this process, many cities that were previously associated to regional utilities lacked specialized employees. Transition and Private Participation, in this case, could be associated with restoring utilities' personnel.

C. Efficiency

The first efficiency indicator, the percent of non-billed water, decreased consistently, particularly in the second phase when losses were reduced by approximately 9.8 percent on average. The analysis in growth rates confirms that the reductions in losses were greater after the transition. Overall, the amount of unaccounted for water was 13 percent smaller than before the participation of the private sector.

The percent of metered connections, our second indicator, did not change significantly during the transition period, but it increased approximately 7.35 percent between A and T. Finally, the percent collected of total bills decreased between public and transition, but it started recovering back after private participation took place.

As supported by the Agency View theory, private participation is surely associated with efficiency in performance of WSS utilities.

D. Coverage

Coverage, measured by the ratio between population reached by water or sanitation services and total population in the area provides a good picture of how the services expand net the natural growth in population

In the case of Colombia, coverage improved significantly across all periods. The coverage of water services improved by 17.4 percent overall while the gains for coverage of sewerage services were on average 15.8 percent higher over the whole period. Private participation also affected the trends of expansion between public and transition periods, but these changes did not persist in the long run.

E. Quality

Quality is represented by continuity and measured by the average number of hours of water services per day. This indicator increased on average more than 80 percent between transition and private participation periods. The sample size prevents other comparisons.

F. Labor Productivity

The results on productivity gains are ambiguous. Despite the increase in the number of employees, connections per employees increased consistently by a total of 27.7 percent over previous levels. Labor productivity did not change significantly when measured by cubic meters per employee. As the volume billed remained constant between B and T, the increase in the number of workers resulted in an initial loss of productivity. As volume of billed water started expanding, productivity levels were reestablished.

G. Prices

The tariff system for WSS in Colombia is set in a way such that consumers are cross-subsidized. Residential subscribers are divided into 6 different strata according to their income level. Stratum 4 is the neutral stratum and does not receive or pay subsidies. Strata 5 and 6 cross subsidize the consumption of Strata 3, 2 and 1 (1 being the poorest). For each stratum, consumers must pay a fixed charge plus a basic tariff per cubic meter consumed up to 20 m³. A complementary tariff is charged for additional consumption up to 40 m³ and above this level, a third tariff value is implemented.

Our real prices indicators consist of a constructed monthly charge based on the consumption level of a typical household in the stratum. We chose to analyze strata 4 and 1. Stratum 4 gives a neutral perspective of how real prices evolved, and stratum 1 indicates how the poorest consumers were relatively affected. Average tariffs combine the fixed charge with an average consumption of 20 m³ per month.

Average tariffs increased significantly for both services and strata between the transition and the private participation periods. A typical consumer of stratum 4 paid 53.5 percent more for water services and approximately 46.4 percent more for sewerage services between B and A. For stratum 1 the price level increased even more, on average 158 percent for water services and 181 percent for sewerage services between B and T. The analysis in trends showed a faster growth in prices after transition. It is puzzling that tariffs increased significantly more for low income consumers. This seems to be a pattern also followed by firms that did experience private intervention.

H. Financial

Costs and revenues per output increased significantly between T and A. Our estimates show that the magnitude of the variation was similar for the two indicators

so that the ration revenues per operational expenditures did not change significantly. These results work against the idea that an increase in tariffs is associated with higher profits to the privatized company. The rise in sales expenditures suggests that utilities expanded their services to more costly consumers. Rises in tariffs and average revenues seem just enough to compensate larger average costs.

Labor expenditures per unit of output decreased significantly between B and T, but increased between T and A. The aggregate effect is negative. The share of labor expenditures in the Operational expenditures also decreased with private participation, indicating a more efficient use of labor.

Figure 63 reports the tendencies of the relevant indicators. The vertical line indicates the beginning of private participation.

Figure 63. WSS indicators

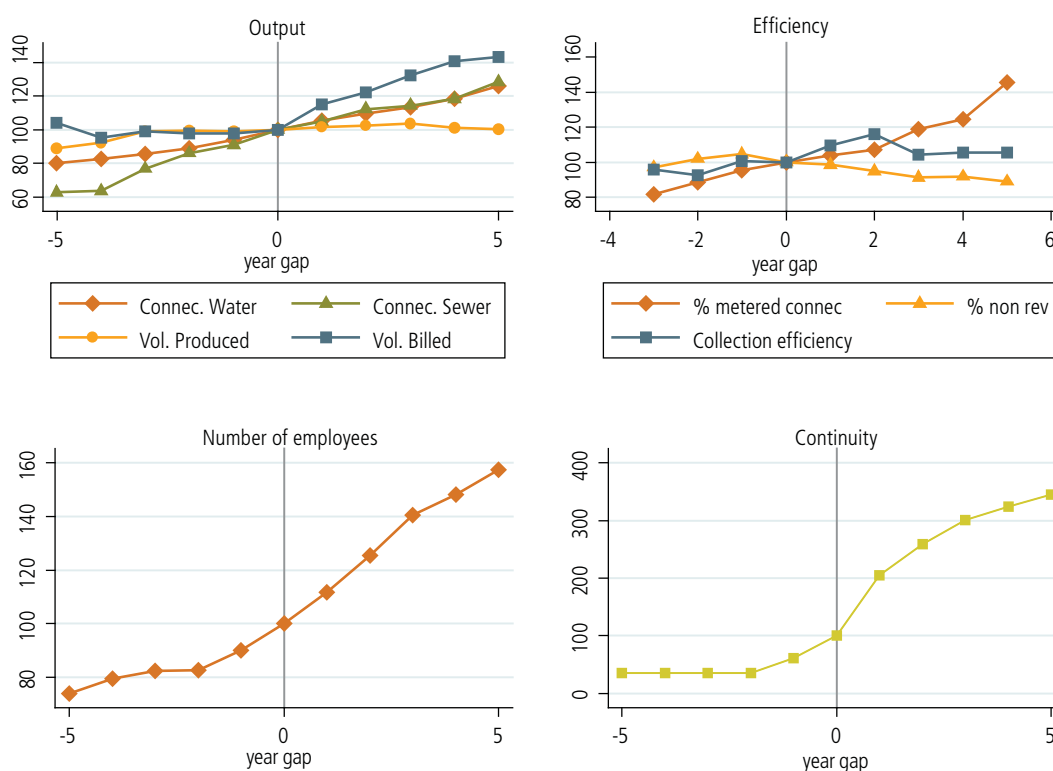


Figure 63 (Cont.): WSS indicators

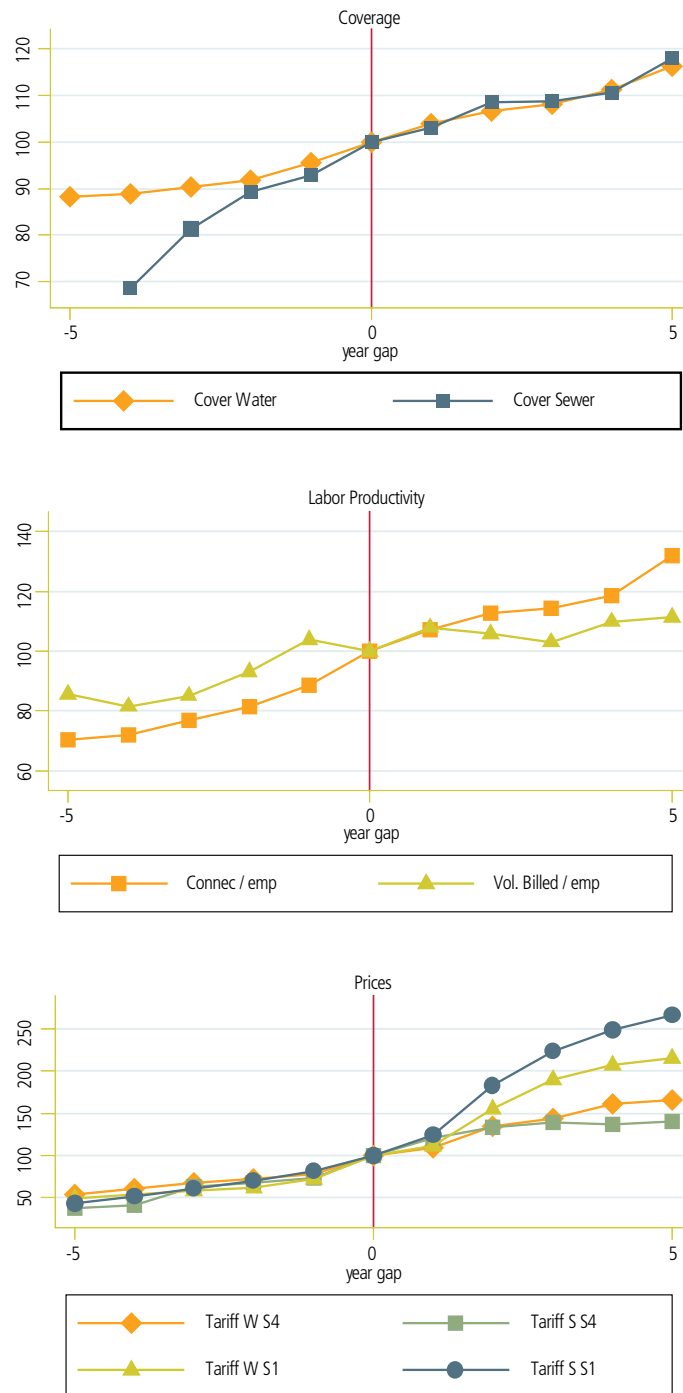
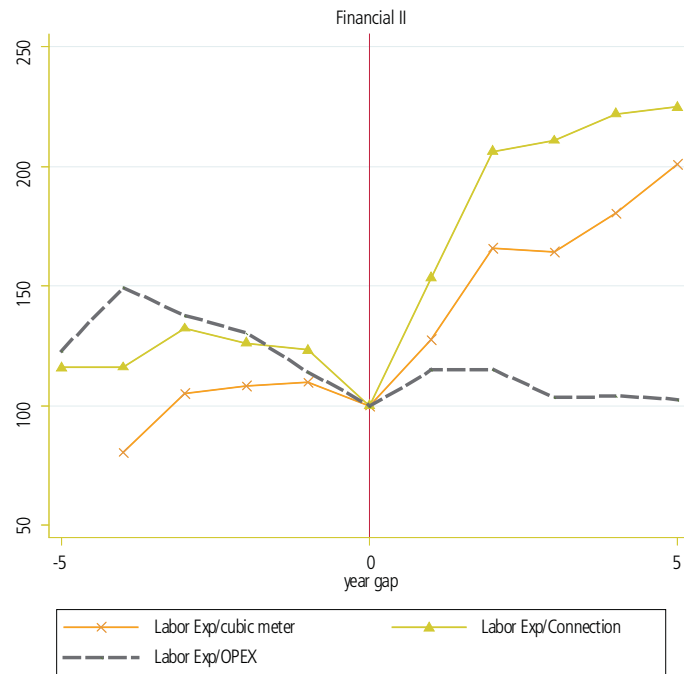
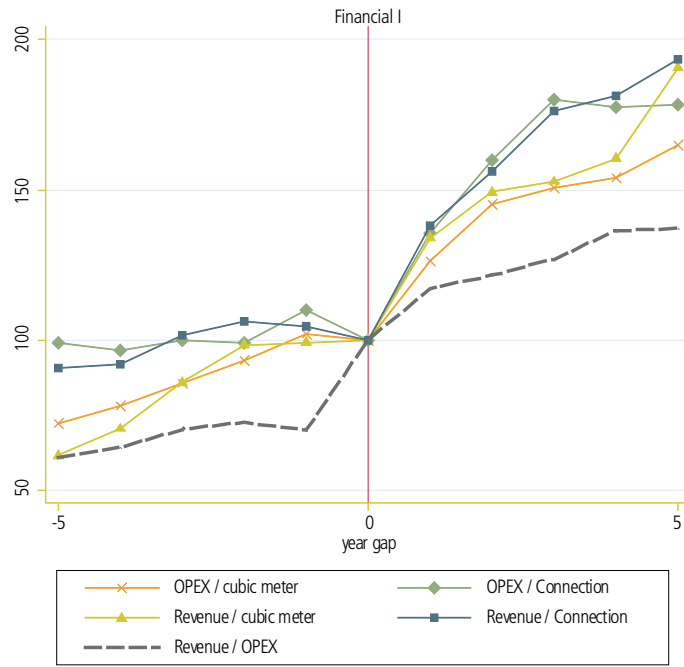


Figure 63 (Cont.): WSS indicators



3.3.2. Econometric Analysis

In this section, we further develop the previous analysis estimating several specifications for the indicators in both levels and rates of growth. For each set of indicators, the coefficients for the two main dummies are presented: *Transition* that has a value equal to one from one year before private participation until one year after, and *After* that has a value equal to one for four years after the transition period. We estimate three different models: Model 1 uses log level as dependent variable and control for firm specific fixed effect, Model 2 equals Model 1 plus firm specific time and Model 3 uses log growth as dependent variable.

Table 35 below present the most relevant model for each indicator analyzed. The complete set of results (all indicators - all models) is presented in the appendix. Columns (1) and (2) present the estimates for the log levels without the firm-specific time trends; columns (3) and (4) show the estimates with the city-specific time trends. OLS estimates are qualitatively similar but quantitatively larger than FGLS predictions. Unless indicated otherwise in the text, we will mainly discuss the results from FGLS estimation.

Table 35. Regression Analysis

Dependent Variable (in logs)		Model 1		Model 2	
		OLS (1)	FGLS (2)	OLS (3)	FGLS (4)
Connec. W (total)	Transition			0.01 (.0321)	0.025*** (.0079)
	After			0.053 (.0429)	0.031*** (.0123)
	N			276	343
Connec. S (total)	Transition			0.081*** (.0207)	0.062*** (.0119)
	After			0.092*** (.0279)	0.071*** (.0126)
	N			230	287
Volume Prod.	Transition			0.061 (.0621)	0.012 (.011)
	After			0.106 (.0777)	0.059*** (.011)
	N			249	311

Dependent Variable (in loqs)		Model 1		Model 2	
		OLS	FGLS	OLS	FGLS
Volume Billed	Transiton			0.054 (.0611)	0.014 (.0556)
	After			0.139 (.0811)	0.055*** (.0167)
	N			215	271
Volume per connec.	Transiton	0.034 (.0742)	-0.122*** (.0187)		
	After	0.139 (.0843)	-0.149*** (.0189)		
	N	209	263		
Employees	Transiton	0.182*** (0.054)	0.139*** (.0174)		
	After	0.170*** (.0639)	0.187*** (.0179)		
	N	336	418		
Percentage of non billed water	Transiton	0.317*** (.0796)	-0.061** (.0226)		
	After	0.246*** (.0904)	-0.118*** (.0227)		
	N	218	271		
Percentage of metered connec.	Transiton	0.013 (.0473)	-0.002 (.0134)		
	After	-0.009 (.0588)	0.048*** (.0254)		
	N	90	113		
Efficiency of Collection	Transiton	0.14 (.2145)	-0.042** (.0182)		
	After	0.29 (.2484)	-0.023 (.0195)		
	N	36	50		
Coverage W	Transiton	0.045 (.0295)	0.078*** (.0109)		
	After	0.097** (.033)	0.113*** (.0109)		
	N	273	339		

3. Assessing the Effect of Private Participation in Water Supply and Sanitation

Dependent Variable (in loqs)		Model 1		Model 2	
		OLS	FGLS	OLS	FGLS
Coverage S	Transiton	0.063** (.027)	0.062*** (0.0128)		
	After	0.066*** (.0312)	0.112*** (.0129)		
	N	232	290		
Continuity	Transiton	0.048	0.299***		
	After	(.0554)	(.0154)		
	N	88	117		
Volume Billed/ Employees	Transiton			-0.129* (.0763)	-0.059** (.0287)
	After			-0.061 (.1031)	-0.023 (.0308)
	N			191	244
Total Connec./ Employee	Transiton			0.041** (.0171)	0.042** (.007)
	After			0.057** (.0238)	0.0458** (.0073)
	N			269	337
Average tariff W (S4) - Pesos	Transiton	0.213** (.0943)	0.136*** (.0246)		
	After	0.126 (.1211)	0.292*** (.0254)		
	N	127	162		
Average tariff W (S1) - Pesos	Transiton	0.165* (.0933)	0.325*** (.0407)		
	After	0.176 (.1189)	0.588*** (.0431)		
	N	123	160		
Average tariff S (S4) - Pesos	Transiton	0.177* (.0983)	0.131*** (.0367)		
	After	0.185 (.1222)	0.226*** (.0374)		
	N	107	137		

Dependent Variable (in loqs)		Model 1		Model 2	
		OLS	FGLS	OLS	FGLS
Average tariff S (S1) - Pesos	Transiton	0,155 (.0958)	0.393*** (.0469)		
	After	0.198* (.1189)	0.723*** (.0501)		
	N	113	145		
Opex per m ³	Transiton	0.219** (.1107)	0.269*** (.0467)		
	After	0.366*** (.1281)	0.307*** (.0468)		
	N	149	194		
Opex per connection	Transiton	0.003 (.0931)	-0.009 (.0432)		
	After	0.105 (.1084)	0.012 (.0433)		
	N	168	215		
Revenue per m ³	Transiton	0.083 (.0973)	0.154*** (.0331)		
	After	0.169 (.1117)	0.333*** (.0332)		
	N	154	204		
Revenue per connection	Transiton	0.005 (.0827)	0.018 (.0094)		
	After	0.116 (.0946)	0.147*** (.0128)		
	N	173	224		
Labor Exp per m ³	Transiton	0.023 (.1541)	-0.017 (.0966)		
	After	0.063 (.1765)	0.132 (.0967)		
	N	132	171		
Labor Exp per connection	Transiton	-0.064 (.1328)	-0.161** -0.0698		
	After	0.0165 (.1502)	-0.155** (.0698)		
	N	146	187		

Dependent Variable (in logs)		Model 1		Model 2	
		OLS	FGLS	OLS	FGLS
Revenues/Opex	Transition	-0.032 (.0463)	-0.002 (.0212)		
	After	-0.019 (.0567)	0.042* (.2101)		
	N	230	288		

A. Output Indicators

It is intuitive that output variables present a natural trend off growth relate with population and income growth. For this reason, we chose model 2 and model 3 as the best models to represent the real impact of private intervention. Within Table 35, Table 5 shows improvements in both the transition and pure private periods. The average level of the number of water of connections rose by 2.5 percent with respect to its natural trend, and the average rise after the transition was 3.1 percent with respect to the solely public trend. For sewerage, the second model showed gains of 6 percent during the transition period and 7.1 percent afterwards. Private participation resulted in a significant increase in the growth rate of expansion of sewerage connections.

According to the first model the volume of water produced decreased by 4.7 percent during transition and by 6 percent during the post transition. Volume of billed water did not change systematically during this period, while the average volume per connection decreased. Based on this evidence we can conclude that private participation had an important role in expanding services at the extensive margin. However, at the intensive margin output decreased significantly. Two factors help to explain this contraction: first, the overall improvement in the network and the reduction of losses in the system; second, the increase in real tariffs and the consequent reduction in individual demand.

B. Number of Employees

The first model is consistent with the previous analysis predicting a significant expansion in the number of employees. The water and sanitation sector hires or hired on average 13.9 percent more in transition as compared to before the private participation and 18.7 percent more after transition as compared to before private participation. Growth rates in employment were significantly higher during the transition but the effect of private participation in growth disappeared afterwards.

C. Efficiency

An important reduction in distributional losses can be observed due to change in ownership. One might assume that in order to improve performance, the firms would improve maintenance and investments in the network. The results of the analysis support this assumption: the total drop in non-billed water was 5 percent during the transition, followed by a decrease of 12 percent in losses when compared to pure public levels. The percent of metered connections did not experience significant changes during the transition period, but increased by almost 4.8 percent after private participation took place. Finally, the collection of revenues seemed to worsen during the transition: firms experienced an average drop of approximately 4.2 percent during this period. During the post transition, however, average levels recovered and returned to their level at the solely public administration.

In accordance to the Agency View predictions, private participation had a positive role in overall efficiency. The impacts from private intervention in WSS were more intense in the post transition period, supporting the idea that long-run efficiency gains prevailed instead of those related to transitional adjustments as found by Andres, Foster, and Guasch (2006) and Andres et al. (2008).

D. Coverage

Given the population's natural growth, it is interesting to analyze the change in coverage in order to identify whether the expansion of the network was driven by the natural increase of households or by the net increase of the number of connections. The results suggest that there was a significant net expansion of services. The average increase in coverage of water services was 8 percent during the transition, while the average increase was 11.5 percent in the period after. For sewerage, the average increases were 6.3 percent and 11.4 percent respectively. After controlling for time trends, the results remained significantly positive and particularly stronger for the transition period. This evidence supports the effectiveness of private investments in the expansion of water and sanitation provision. It also disproves that profit maximization strategies of the private utilities are associated with output reduction and the exclusion of small or higher cost consumers. In further analysis (available upon request) we verify that network expansion in WSS was more intense among middle and low income residential consumers.

E. Quality

The estimates demonstrated important improvements in the duration of services due to the change in ownership both during the transition and after. Controlling for time trends, the average number of hours of service a day increased 34.8 percent during transition. The small sample size prevents us, however, from identifying the effects during the post transition period.

F. Labor Productivity

Labor productivity is defined as the ratio between units of output and numbers of employees. By construction, this indicator is also likely to evolve according to a natural trend. The results for output and number of employees clearly influenced the labor productivity indicators. The increase in number of employees overcame the changes in billed water, such that the volume per employees decreased on average 5.9 percent between B and T.

If we consider average connections per employee as our indicator of productivity, the results change radically. The models indicate a substantial increase in labor productivity. More precisely, average level of connections per employee increased 4.2 percent during transition and 4.8 percent during the post transition period. Growth rates of productivity rose by 25 percent during transition, and increased 16.8 percent afterwards according to this indicator.

The gains of productivity evidenced by the connections per employee indicator are consistent with the predictions of both the Agency and Social Views. Nevertheless, the opposite movements of our two productivity indicators prevent us from drawing definite conclusions about the role of private intervention.

G. Prices

The estimates from the first model suggest that real prices increase significantly for all services and strata. The analysis in levels showed an average increase of more than 40 percent in services for consumers of stratum 4 after private participation and an average increase of more than 73 percent for the poorest consumer in the post transition period. These results seem consistent with the traditional findings in the literature that private participation is associated with higher costs for consumers. As we carefully analyze the second model, the existence of a positive and steep time trend in prices becomes clear. After controlling for trends, the effect of private participation on prices becomes non significant.

H. Financial

The estimates of the first model confirm the results found in the means and medians analysis: both revenues and expenditures increased significantly during and after the transition to private. However, the econometric approach reveals that the increase in revenues overpassed the change in costs in the post transition period, such that the revenues per operational expenditures ratio increased on average 4.3 percent. These indicators are consistent with the association between private participation and significant increases in profits. Nevertheless, it is worthwhile to remark that these indicators ignore investment expenditures and that the additional revenues could in fact be partially financing the expansion of services observed.



3.4. Additional Considerations

So far, the study has focused on understanding the average effect of private participation, using the individual local provider of services as the object of our analysis. One possible critique to this approach is the fact that it attributes equal weight to all firms independently of their size and their representation in the sector. In other words, it is possible that our results are mainly driven by firms in small cities, and that private intervention has no effect in the majority of consumers. It is also possible that our results are driven by the larger cities in our sample while the small ones did not benefit from private sector participation.

In order to verify the robustness and generality of the results in the previous section, we re-estimated the first and second models of the econometric analysis using different samples. Table A1 (Appendix) displays the results found. Columns (1) and (2) repeat the estimates of previous sections using the equal weight full sample as benchmark. Columns (3) and (4) present the results of a weighted estimation of models 1 and 2, using the city's population as weight variable. Columns (5) and (6) estimates exclude small and medium small cities from the sample. These results represent the effects of private intervention for firms with more than 75,000 habitants. Finally, Columns (7) and (8) describe the results excluding large cities (cities with more than 300,000 habitants).

The results in Table A1 (Appendix) support the robustness of our previous estimates. Changes in the sample have small effects in the magnitude, but do not affect the direction and significance of private participation coefficients for most indicators.

Another source of concern about the quality of the results found is the fact that the private participation dummies are potentially endogenous. If, for example, private sector participation is correlated with firm performance or potential performance, even after controlling for city specific effects, the results associated with private participation might simply be a reflection of firms' characteristics in the period.

The general approach suggested by the literature to solve this type of problem is the use of Instrumental Variables, but no proper instrument has been found yet in our context. Andres and Cunha (2007) compare public utilities, private utilities and utilities that underwent private intervention during 1995 and 2006 in Colombia. The study finds that the firms that experienced private participation initially performed similarly and in some cases even worse than those that did not. Although not conclusive, this evidence corroborates the one found in our analysis.



3.5. Final Remarks of this Chapter

This chapter analyzed the effects of private participation on indicators of output, employment, efficiency, quality, labor productivity, coverage, prices, costs and revenues for 118 cities served by 77 water and sanitation utilities in Colombia.

The main contribution of this analysis is to expand the analysis proposed by Andres, Foster, and Guasch (2006) and Andres et al. (2006) to the water and sanitation sector in Colombia. It adds a systematic evaluation of private participation to WSS, thus contributing to the natural resources literature. This study combines both financial and non-financial performance indicator analysis, examining the impacts of private intervention on both levels and growth rates of each indicator. Like Andres et al. (2006), we separate short-term and long-term effects of private participation, a distinction ignored by previous work on the topic.

The results found are summarized in Table 36. Private sector participation is associated with higher levels of output, employment, efficiency, labor productivity, quality and coverage after the transition period. Number of connections, coverage, and percent of non-billed water and labor productivity also show significant changes in levels between the public and the transition periods. This observation indicates that pre-private reforms were effective in WSS in Colombia, and that most of their results persisted or even intensified over time. The analysis taking into account city-specific time trends leads to more modest but still significant results.

Price levels were also significantly affected by private participation. Consumers of both services, stratum 1 and stratum 4, experienced increases in average tariffs. Nevertheless, correcting for trends mitigates the effect of private participation on

tariffs during and after the transition period. The revenues and expenditures indicators displayed a positive variation in levels during the period, but the trend analysis suggests that private participation reduced the speed at which these indicators evolved. Changes in revenues per output were larger than those in operational and sales expenditures. Further analysis is necessary to understand if the net revenues gains were reverted in profits or investments in the expansion and quality of services.

In order to verify the robustness and generality of our results we repeated the estimation procedure for different sub-samples. Weighting the observations by population, excluding small cities from the sample, and excluding highly populated cities leave the effects of private intervention in WSS unchanged.

While extremely relevant for WSS in Colombia, the process of private participation is far from being homogeneous across utilities. A future step in our research will be to investigate the impact of different forms of private participation on the performance of water and sanitation utilities.

Table 36. Summary of the Results

	Results	
	Transition	Post Transition
Connection	↑	↑
Volume Sold	=	↑
Number of employees	↑	↑
Labor productivity (connec/employee)	↑	↑
Efficiency	↑	↑
Continuity	↑	
Coverage	↑	↑
Average Prices	↑	↑
Operational Expenditures per Output	↑	↑
Revenues per Output	↑	↑
Labor Exp per Output	↓	↓

Appendix

Table A1: Additional Analysis

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k		
	model 1 (1)	model 2 (2)	model 1 (3)	model 2 (4)	model 1 (5)	model 2 (6)	model 1 (7)	model 2 (8)	
Connec. W (total)	Transition	0.137*** (.01355)	0.026*** (.0079)	0.157*** (.0148)	0.041*** (.0148)	0.138*** (.0158)	0.037*** (.0122)	0.185** (.0177)	0.073*** (.0144)
	After	0.203*** (.0136)	0.031*** (.0123)	0.237*** (.0149)	0.037*** (.0106)	0.216*** (.0161)	0.032** (.0151)	0.246*** (.0177)	0.063*** (.0152)
	N	343	343	435	435	182	182	373	373
Connec. S (total)	Transition	0.139*** (.0141)	0.062*** (.0119)	0.176*** (.0196)	0.056*** (.0118)	0.192*** (.0218)	0.068*** (.0153)	0.164*** (.0238)	0.078*** (.0163)
	After	0.23*** (.0142)	0.071*** (.0126)	0.302*** (.0196)	0.049*** (.0138)	0.288*** (.0219)	0.064*** (.0182)	0.279*** (.0239)	0.05*** (.0178)
	N	287	287	373	373	178	178	311	311
Volume Prod.	Transition	-0.046** (.0179)	0.012 (.011)	-0.076*** (.0218)	0.012 (.0219)	-0.073*** (.0274)	0.023 (.0215)	-0.089*** (.0244)	0.008 (.0247)
	After	-0.059*** (.0177)	0.059*** (.011)	-0.089*** (.0219)	0.04* (.0234)	-0.082*** (.0273)	0.052** (.0246)	-0.093*** (.0246)	0.069** (.0271)
	N	311	311	403	403	176	176	341	341
Volume Billed	Transition	-0.022* (.011)	0.014 (.0556)	0.028 (.0277)	.067*** (.0676)	-0.051 (.0345)	0.028 (.0322)	-0.068*** (.0232)	-0.018 (.0295)
	After	0.015 (.0111)	0.055*** (.0167)	0.091*** (.0278)	.159*** (.0208)	-0.028 (.0351)	0.089** (.0384)	-0.012 (.0232)	0.017 (.0305)
	N	271	271	335	335	169	169	271	271

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k		
	model 1	model 2	model 1	model 2	model 1	model 2	model 1	model 2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Volume per connec.	Transition	-0.122*** (.0187)	-0.027 (.0252)	-0.149*** (.0278)	0.003 (.0284)	-0.167*** (.0366)	-0.127 (.0358)	-0.252*** (.0324)	-0.102*** (.0384)
	After	-0.149*** (.0189)	-0.794 (.0253)	-0.158*** (.0279)	0.067** (.0306)	-0.186*** (.0368)	0.058 (.0441)	-0.247*** (.0326)	-0.059 (.0396)
	N	263	263	329	329	168	168	267	267
Employees	Transition	0.139*** (.0174)	0.033** (.0147)	0.043** (.0193)	-0.125*** (.2513)	0.136*** (.0329)	-0.038 (.0428)	0.113*** (.0231)	-0.055** (.0246)
	After	0.187*** (.0179)	-0.002 (.1383)	0.083*** (.0204)	-0.061** (.0251)	0.182*** (.0357)	-0.022 (.0451)	0.175*** (.0242)	-0.012 (.0256)
	N	418	418	507	507	178	178	442	442
Percentage of billed water	Transition	-0.051** (.0226)	-0.026 (.0198)	-0.039* (.0238)	0.008 (.0227)	-0.016 (.027)	0.027 (.0247)	-0.061** (.0259)	-0.009 (.0357)
	After	-0.118*** (.0227)	-0.064*** (.0199)	-0.119*** (.0238)	-0.017 (.0243)	-0.078*** (.027)	0.019 (.0306)	-0.139*** (.026)	-0.052 (.036)
	N	271	271	344	344	185	185	279	279
Percentage of metered connec.	Transition	-0.002 (.0134)	-0.022 (.0145)	-0.018 (.0219)	-0.073*** (.0245)	0.015 (.0278)	-0.053* (.0276)	0.069*** (.0256)	-0.096*** (.0207)
	After	0.048*** (.0254)	-0.014 (.0151)	0.075*** (.0261)	-0.064** (.0258)	0.097*** (.0332)	-0.04 (.0319)	0.133*** (.0267)	-0.117*** (.0223)
	N	113	113	142	142	90	90	102	102

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k		
	model 1	model 2	model 1	model 2	model 1	model 2	model 1	model 2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Efficiency of Collection	Transition	-0.042** (.0182)	0.005 (.0095)	-0.057*** (.0172)	-0.03 (.0236)	-0.71* (.0369)	-0.051 (.0313)	-0.158 (.1314)	-0.079 (.1566)
	After	-0.023 (.0195)	0.049*** (.0147)	-0.006 (.024)	0.034 (.0333)	-0.026 (.0403)	-0.005 (.0369)	-0.089 (.1354)	-0.048 (.1567)
	N	50	50	72	72	57	57	31	31
Coverage W	Transition	0.078*** (.0109)	0.026*** (.0077)	0.054*** (.0163)	0.057*** (.0063)	0.068*** (.0199)	0.039*** (.0126)	0.049* (.0158)	0.024* (.0137)
	After	0.113*** (.0109)	0.037*** (.0078)	0.119*** (.0171)	0.069*** (.0076)	0.126*** (.0209)	0.059*** (.0146)	0.112*** (.0166)	0.019 (.0146)
	N	339	339	196	196	124	124	139	139
Coverage S	Transition	0.062*** (.0128)	0.057*** (.0119)	0.048*** (.0163)	0.015* (.0084)	0.043** (.017)	0.172* (.0009)	0.028** (.0137)	-0.067*** (.0109)
	After	0.112*** (.0129)	0.065*** (.0129)	0.121*** (.0165)	0.016* (.0084)	0.093*** (.0179)	0.019 (.0144)	0.04*** (.0141)	-0.105*** (.0121)
	N	290	290	232	232	134	134	171	171
Continuity	Transition	0.299*** (.0154)	-0.001 (.0046)	-0.278*** (.029)	0.33 (.7047)	-0.296*** (.0403)	-0.023** (.0094)		0.259 (.6317)
	After				0.301 (.7049)			0.542*** (.0736)	0.214 (.6348)
	N	117	117	116	116	58	58	88	88

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k		
	model 1	model 2	model 1	model 2	model 1	model 2	model 1	model 2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Volume Billed/ Employees	Transition	-0.058** (.0292)	-0.059** (.0287)	-0.111*** (.0463)	0.044 (.0518)	-0.156*** (.0363)	0.164 (.0584)	-0.212*** (.0353)	-0.101*** (.0544)
	After	-0.103*** (.0292)	-0.023 (.0308)	-0.103** (.0465)	0.021 (.0581)	-0.194*** (.0374)	-0.006 (.0698)	-0.186*** (.0356)	-0.175*** (.0645)
	N	244	244	316	316	151	151	260	260
Total Connec/ Employee	Transition	0.148*** (.0123)	0.042*** (.007)	0.172*** (.0173)	0.043*** (.0101)	0.159*** (.0183)	0.04*** (.0122)	0.201*** (.0252)	0.065*** (.0173)
	After	0.225*** (.0125)	0.0458** (.0073)	0.256*** (.0173)	0.033*** (.0113)	0.244*** (.0182)	0.288** (.0141)	0.262*** (.0253)	0.041** (.0184)
	N	337	337	439	439	182	182	377	377
Average tariff W (S4) - Pesos	Transition	0.136*** (.0246)	0.021 (.0214)	0.157*** (.0361)	-0.034 (.0396)	0.132*** (.046)	-0.005 (.0442)	0.093** (.0372)	-0.156*** (.0528)
	After	0.292*** (.0254)	0.047** (.0215)	0.381*** (.0385)	-0.038 (.0399)	0.388*** (.0506)	-0.031 (.0515)	0.219*** (.0395)	-0.147*** (.0539)
	N	162	162	230	230	136	136	168	168
Average tariff W (S1) - Pesos	Transition	0.325*** (.0407)	-0.091*** (.0075)	0.441*** (.0442)	-0.028*** (.0333)	0.439*** (.0536)	-0.068 (.0519)	0.439*** (.0455)	0.064 (.0471)
	After	0.588*** (.0431)	-0.087*** (.0076)	0.852*** (.0486)	-0.159*** (.0337)	0.904*** (.0579)	0.1** (.0543)	0.608*** (.0475)	0.149*** (.0497)
	N	160	160	226	226	137	137	169	169

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k		
	model 1	model 2	model 1	model 2	model 1	model 2	model 1	model 2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Average tariff S (S4) - Pesos	Transition	0.131*** (.0367)	0.039*** (.0122)	0.218*** (.0444)	0.057 (.0524)	0.182*** (.0507)	0.08 (.0555)	0.175*** (.0383)	0.011 (.0641)
	After	0.226*** (.0374)	0.052 (.0126)	0.476*** (.0457)	0.073 (.0525)	0.467*** (.0518)	0.051 (.0599)	0.233*** (.0393)	0.084 (.0649)
	N	137	137	193	193	127	127	134	134
Average tariff S (S1) -Pesos	Transition	0.393*** (.0469)	-0.046 (.0399)	0.453*** (.0376)	-0.252*** (.048)	0.456*** (.0643)	-0.034 (.0643)	0.552*** (.0421)	0.157*** (.0483)
	After	0.723*** (.0501)	-0.022 (.0418)	0.952*** (.0476)	-0.131*** (.0473)	1.04*** (.0675)	0.18** (.0751)	0.808*** (.043)	0.266*** (.0484)
	N	145	145	203	203	124	124	146	146
Opex per m ³	Transition	0.269*** (.0467)	-0.05 (.046)	0.155*** (.0453)	-0.224** (.0954)	0.305*** (.0747)	-0.179** (.0815)	0.373*** (.0447)	-0.024 (.0479)
	After	0.307*** (.0468)	-0.042 (.0502)	0.207*** (.0506)	-0.183* (.0994)	0.334*** (.0787)	-0.155 (.0973)	0.498*** (.0467)	0.093* (.0523)
	N	194	194	236	236	139	139	183	183
Opex per connection	Transition	-0.009 (.0432)	-0.143*** (.0522)	-0.074* (.0449)	-0.383*** (.0787)	-0.021 (.0567)	-0.294*** (.0629)	0.627 (.0438)	-0.976 (.0635)
	After	0.012 (.0433)	-0.106** (.0524)	-0.108** (.0464)	-0.27*** (.0818)	0.037 (.0629)	-0.173*** (.0799)	0.12** (.0501)	0.044 (.068)
	N	215	215	280	280	142	142	228	228

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k		
	model 1	model 2	model 1	model 2	model 1	model 2	model 1	model 2	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Revenue per m ³	Transition	0.154*** (.0331)	0.008 (.0084)	0.173*** (.028)	-0.188** (.0875)	0.177*** (.0377)	-0.098 (.081)	0.24*** (.0404)	-0.016 (.0164)
	After	0.333*** (.0332)	-0.013 (.0163)	0.401*** (.035)	-0.212** (.0949)	0.382*** (.0466)	-0.176* (.0945)	0.437*** (.0462)	-0.013 (.04)
	N	204	204	246	246	144	144	193	193
Revenue per connection	Transition	0.018 (.0094)	-0.06 (.0268)	0.006 (.0331)	-0.314*** (.0697)	-0.002 (.0402)	0.299*** (.0522)	0.038*** (.013)	-0.062 (.0383)
	After	0.147*** (.0128)	0.006 (.03)	0.182** (.0388)	-0.169** (.0721)	0.229*** (.0484)	-0.178*** (.0674)	0.165*** (.0274)	0.081* (.046)
	N	224	224	283	283	148	148	231	231
Sales cost per m ³	Transition	-0.017 (.0966)	-0.067 (.057)	0.439*** (.0489)	-0.131** (.0678)	0.579*** (.0516)	-0.008 (.0646)	0.599*** (.0351)	0.319*** (.0623)
	After	0.132 (.0967)	-0.104 (.0603)	0.583*** (.0489)	-0.216*** (.0728)	0.672*** (.0586)	-0.112 (.0718)	0.761*** (.0438)	0.267*** (.0678)
	N	171	171	210	210	126	126	173	173
Sales cost per connection	Transition	-0.161** (.0698)	-0.024 (.0677)	0.178*** (.0504)	-0.347*** (.0611)	0.232*** (.0595)	-0.209*** (.0755)	0.457*** (.0397)	0.334*** (.0835)
	After	-0.155** (.0698)	-0.026 (.0678)	0.23*** (.0554)	-0.358*** (.0677)	0.339*** (.0727)	-0.211** (.0859)	0.571*** (.0563)	0.372*** (.087)
	N	187	187	236	236	123	123	201	201

Dependent Variable (in logs)	full sample		weighted regression		Pop>75k		Pop>300k	
	model 1	model 2	model 1	model 2	model 1	model 2	model 1	model 2
Revenues/Opex								
Transition	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	-0.002 (.0212)	0.019 (.0183)	0.036*** (.0141)	0.001 (.0187)	0.089** (.0356)	0.008 (.0284)	0.007 (.0157)	-0.039** (.018)
After	0.042* (.2101)	0.055** (.0242)	0.161*** (.0234)	-0.024 (.0237)	0.202*** (.04)	-0.023 (.0414)	0.019 (.0196)	-0.056** (.0237)
N	288	288	366	366	154	154	315	315

Table A2: Regression Analysis

Dependent Variable (in logs)		Model 1		Model 2		Model 3	
		OLS	FGLS	OLS	FGLS	OLS	FGLS
		(1)	(2)	(3)	(4)	(5)	(6)
Convec. W (total)	Transiton	0.048* (0.0278)	0.137*** (.01355)	0.01 (.0321)	0.026*** (.0079)	-0.133 (.3578)	-0.97 (.134)
	After	0.096*** (0.0317)	0.203*** (.0136)	0.053 (.0429)	0.031*** (.0123)	-0.335 (.2303)	-0.23 (.1343)
	N	276	343	276	343	218	282
Convec. S (total)	Transiton	0.074** (.0345)	0.139*** (.0141)	0.081*** (.0207)	0.062*** (.0119)	0.137 (.4161)	0.198*** (.0722)
	After	0.085** (.0396)	0.23*** (.0142)	0.092*** (.0279)	0.071*** (.0126)	-0.105 (.4537)	0.228*** (.0759)
	N	230	287	230	287	174	219
Volume Prod.	Transiton	0.235*** (.0704)	-0.046** (.0179)	0.061 (.0621)	0.012 (.011)	-1.765* (.9518)	-2.094 (.168)
	After	0.394*** (.0759)	-0.069*** (.0177)	0.106 (.0777)	0.059*** (.011)	-1.531 (.6606)	-0.194 (.1679)
	N	249	311	249	311	76	114
Volume Billed	Transiton	0.019 (.0599)	-0.022* (.011)	0.054 (.0611)	0.014 (.0556)	0.507 (1.115)	0.081 (.2431)
	After	0.074 (.0679)	0.015 (.0111)	0.139 (.0811)	0.055*** (.0167)	-0.684 (1.118)	0.749*** (.2376)
	N	215	271	215	271	87	127
Volume per convec.	Transiton	0.034 (.0742)	-0.122*** (.0187)	0.034 (.0721)	-0.027 (.0252)	0.823 (.7212)	-0.055 (.147)
	After	0.139 (.0843)	-0.149*** (.0189)	0.135 (.098)	-0.794 (.0253)	0.544 (.6267)	0.664*** (.1413)
	N	209	263	209	263	38	65
Employees	Transiton	0.182*** (0.054)	0.139*** (.0174)	0.145*** (.05)	0.033** (.0147)	0.534 (.3464)	0.315** (.1724)
	After	0.170*** (.0639)	0.187*** (.0179)	0.118* (.0665)	-0.002 (.1383)	-0.01 (.4041)	0.071* (.1704)
	N	336	418	336	418	150	209

Dependent Variable (in logs)		Model 1		Model 2		Model 3	
		OLS	FGLS	OLS	FGLS	OLS	FGLS
		(1)	(2)	(3)	(4)	(5)	(6)
Percentage of non billed water	Transiton	0.317*** (.0796)	-0.051** (.0226)	0.024 (.0621)	-0.026 (.0198)	-0.392 (.7503)	0.425 (.2853)
	After	0.246*** (.0904)	-0.118*** (.0227)	-0.796 (.0832)	-0.064*** (.0199)	-0.314 (.7784)	0.424 (.2849)
	N	218	271	218	271	61	90
Percentage of metered connec.	Transiton	0.013 (.0473)	-0.002 (.0134)	-0.535 (.039)	-0.022 (.0145)	-1.58* (.867)	-1.284** (.5279)
	After	-0.009 (.0588)	0.048*** (.0254)	-0.076 (.0519)	-0.014 (.0151)	-0.543 (.1052)	-0.757 (.5396)
	N	90	113	90	113	37	65
Efficiency of Collection	Transiton	0.14 (.2145)	-0.042** (.0182)	-0.065 (.0845)	0.005 (.0095)	0.983** (.3076)	-0.729** (.3506)
	After	0.29 (.2484)	-0.023 (.0195)	-0.043 (.0905)	0.049*** (.0147)		-0.925*** (.3506)
	N	36	50	36	50	12	20
Coverage W	Transiton	0.045 (.0295)	0.078*** (.0109)	0.024 (.0415)	0.026*** (.0077)	-0.199 (.4077)	-0.162*** (.0356)
	After	0.097** (.033)	0.113*** (.0109)	0.084 (.0552)	0.037*** (.0078)	-0.502 (.4231)	-0.403 (.057)
	N	273	339	273	339	162	216
Coverage S	Transiton	0.053** (.027)	0.062*** (.0128)	0.067*** (.0178)	0.057*** (.0119)	0.089 (.5328)	0.522*** (.1542)
	After	0.066*** (.0312)	0.112*** (.0129)	0.071*** (.0238)	0.066*** (.0129)	-0.526 (.5599)	0.146 (.1582)
	N	232	290	232	290	121	159
Continuity	Transiton	0.048 (.0554)	0.299*** (.0154)	0.022 (.0239)	-0.001 (.0046)	-0.028 (.4702)	-0.868 (.075)
	After						
	N	88	117	88	117	52	74
Volume Billed/ Employees	Transiton	-0.103 (.0861)	-0.058** (.0292)	-0.129* (.0763)	-0.059** (.0287)	-1.522 (.8955)	-1.109** (.5126)
	After	-0.058 (.095)	-0.103*** (.0292)	-0.061 (.1031)	-0.023 (.0308)	-1.905** (.8894)	-0.955* (.5068)
	N	191	244	191	244	57	86

Dependent Variable (in logs)		Model 1		Model 2		Model 3	
		OLS	FGLS	OLS	FGLS	OLS	FGLS
		(1)	(2)	(3)	(4)	(5)	(6)
Total Conne ^c / Employee	Transiton	0.061** (.0275)	0.148*** (.0123)	0.041** (.0171)	0.042*** (.007)	-0.015 (.2731)	0.256*** (.116)
	After	0.078** (.0312)	0.225*** (.0125)	0.057** (.0238)	0.0458** (.0073)	-1.792 (.2966)	0.168*** (.1181)
	N	269	337	269	337	210	267
Average tariff W (S4) - Pesos	Transiton	0.213** (.0943)	0.136*** (.0246)	0.231 (.1397)	0.021 (.0214)	-0.553 (.7191)	-1.025*** (.3129)
	After	0.126 (.1211)	0.292*** (.0254)	0.073 (.1943)	0.047** (.0215)	0.374 (.3991)	-0.122 (.3139)
	N	127	162	127	162	74	98
Average tariff W (S1) - Pesos	Transiton	0.165* (.0933)	0.325*** (.0407)	0.275* (.1639)	-0.091*** (.0075)	-0.743 (.5592)	-0.779*** (.1554)
	After	0.176 (.1189)	0.588*** (.0431)	0.075 (.2362)	-0.087*** (.0076)	0.312 (.6234)	-0.148 (.1363)
	N	123	160	123	160	84	112
Average tariff S (S4) - Pesos	Transiton	0.177* (.0983)	0.131*** (.0367)	0.289* (.1658)	0.039*** (.0122)	-1.191 (.7298)	-0.9*** (.2617)
	After	0.185 (.1222)	0.226*** (.0374)	0.212 (.2227)	0.052 (.0126)	-1.21 (.8064)	-0.598*** (.2175)
	N	107	137	107	137	59	80
Average tariff S (S1) - Pesos	Transiton	0.155 (.0958)	0.393*** (.0469)	0.156 (.1430)	-0.046 (.0399)	-1.026* (.517)	-0.692*** (.1997)
	After	0.198* (.1189)	0.723*** (.0501)	0.118 (.1875)	-0.022 (.0418)	-0.421 (.5566)	-0.09 (.2209)
	N	113	145	113	145	83	107
Opex per m ³	Transiton	0.219** (.1107)	0.269*** (.0467)	0.208* (.1177)	-0.05 (.046)	-1.358 (.9274)	0.189 (.1796)
	After	0.366*** (.1281)	0.307*** (.0468)	0.201 (.1448)	-0.042 (.0502)	-0.704 (1.1514)	0.289 (.2178)
	N	149	194	149	194	82	113

Dependent Variable (in logs)		Model 1		Model 2		Model 3	
		OLS	FGLS	OLS	FGLS	OLS	FGLS
		(1)	(2)	(3)	(4)	(5)	(6)
Opex per connection	Transiton	0.003 (.0931)	-0.009 (.0432)	-0.062 (.0895)	-0.143*** (.0522)	1.444 (.8996)	2.031*** (.3076)
	After	0.105 (.1084)	0.012 (.0433)	0.019 (.1115)	-0.106** (.0524)	0.718 (.9785)	1.651*** (.3095)
	N	168	215	168	215	66	103
Revenue per m ³	Transiton	0.083 (.0973)	0.154*** (.0331)	0.102 (.1022)	0.008 (.0084)	0.111 (.6428)	0.259 (.1102)
	After	0.169 (.1117)	0.333*** (.0332)	0.006 (.1257)	-0.013 (.0163)	0.794 (.7498)	0.2302 (.2331)
	N	154	204	154	204	92	121
Revenue per connection	Transiton	0.005 (.0827)	0.018 (.0094)	0.048 (.0738)	-0.06 (.0268)	-1.197 (.9994)	-0.424* (.2396)
	After	0.116 (.0946)	0.147*** (.0128)	0.081 (.0927)	0.006 (.03)	-0.321 (1.13)	-0.404* (24)
	N	173	224	173	224	79	113
Labor Exp per m ³	Transiton	0.023 (.1541)	-0.017 (.0966)	0.105 (.1471)	-0.067 (.057)	-0.695 (0.89)	0.748** (.3826)
	After	0.063 (.1765)	0.132 (.0967)	0.129 (.1851)	-0.104 (.0603)	-0.185 (1.079)	-0.819** (.3823)
	N	132	171	132	171	61	88
Labor Exp per connection	Transiton	-0.064 (.1328)	-0.161** -0.0698	0.043 (.1141)	-0.024 (.0677)	-0.594 -1.277	-0.291 (.2492)
	After	0.0165 (.1502)	-0.155** (.0698)	0.109 (.1485)	-0.026 (.0678)	-0.071 (1.345)	-1.522*** (.2433)
	N	146	187	146	187	45	72
Revenues/Opex	Transiton	-0.032 (.0463)	-0.002 (.0212)	-0.031 (.0398)	0.019 (.0183)	-1.144** (.6142)	-0.075 (.0727)
	After	-0.019 (.0567)	0.042* (.2101)	-0.095 (.0597)	0.055** (.0242)	-1.207 (.7932)	-0.322** (.1319)
	N	230	288	230	288	95	136

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